THE AMERICAN GAS LIGHT JOURNAL

REDMAN & KENNY, N.Y.

PUBLISHING OFFICE No. 32 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, HEATING, MECHANICAL, CHEMICAL AND GENERAL SCIENCE.

VOLUME LXXV. No. 2. Whole No. 1,361. | NEW YORK, MONDAY, JULY 8, 1901. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager. THOMAS J. CUNNINGHAM and ELBERT P. CALLENDER, Editors.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y. AS SECOND-CLASS MATTER.

Published on each Monday of the year, at No. 32 Pine Street, New York.

Collections are invariably made directly from this office for subscriptions, advertisements, etc. We have agents to solicit the same, but they are not authorized to receipt for money.

Terms of Subscription, Including Postage.—For the United States and Canada, $3 per annum. European countries, $5 (£1—25 francs). All payments to be made in advance. Single copies, 10 cents.

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[OFFICIAL NOTICE.]

Ninth Annual Meeting, Pacific Coast Gas Association.

OFFICE OF THE SECRETARY,
415 POST STREET,
SAN FRANCISCO, CAL.,
June 5th, 1901.

To the Members of the Pacific Coast Gas Association: The Ninth Annual Meeting of the Pacific Coast Gas Association will be held at the offices of the San Francisco Gas and Electric Company, 415 Post street, San Francisco, Cal., Tuesday, Wednesday and Thursday, July 16, 17 and 18, 1901.

The technical programme calls for the following:

"President's Address;" by Mr. John A. Britton, Oakland, Cal.

"Report on International Congress of the Gas Industry, Paris, 1900;" by Mr. J. B. Grimwood, San Francisco, Cal.

"Distribution of Alternating Currents;" by Mr. George C. Holberton, Oakland, Cal.

"Promotion of Domestic Fuel Gas Consumption;" by Mr. R. P. Valentine, Sacramento, Cal.

"Practical Power Transmission;" by Mr. John Martin, San Francisco, Cal.

"Experience with Carburetted Water Gas Sets;" by Mr. A. C. Beck, Oakland, Cal.

"Practical Testing of Oils for Gas and Fuel Purposes;" by Mr. L. P. Lowe, San Francisco, Cal.

"Gas Engines," by Mr. W. J. Casey, San Francisco, Cal.

It is urgently requested that members interest themselves in the "Wrinkle" and "Experience" departments, and that their communications thereon be forwarded without delay to the respective Editors thereof: Mr. George H. Hollidge, Merced, Cal.; and Mr. O. M. Gregory, San Jose, Cal.

Both named departments offer unlimited opportunities for the advancement of our common interests; but the measure of success is entirely dependent upon the efforts of the individual members. Let everyone contribute liberally.

Those who have questions to propound are reminded that the same should be forwarded to the Secretary in good season, in order that the "Question Box" should be filled with interesting matter for discussion by the members.

The Secretary announces that his services are at the ready disposal of the members, and that all communications or requests addressed to him will be promptly replied to or answered. He will be at headquarters prior to and during the meeting, and will be glad to render assistance, in the matter of securing hotel accommodations for those living at a distance, or in any other way whatsoever.

An informal meeting will be held at headquarters, Monday evening, July 15th, to which all are cordially invited.

A banquet will be served the evening of Wednesday, July 17th, and an outing has been arranged for the third day, Thursday, July 18th.

J. B. GRIMWOOD,
Secretary.

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JUL 8 1901

BRIEFLY TOLD.

THE NINTH ANNUAL MEETING OF THE PACIFIC COAST GAS ASSOCIATION.—The official notices that have been appearing in the JOURNAL, respecting the 9th annual meeting of the Pacific Coast Gas Association, go to show that President Britton, Secretary Grimwood and their Editorial and Committee associates, have lost neitheir time nor opportunity in preparing well in advance for a successful and profitable series of sessions. As usual, the meeting place will be in the headquarters of the San Francisco Gas and Electric Company, thanks to the graciousness of the latter; and a better place for holding the sessions is not to be found in California's largest city. The programme put forth by Secretary Grimwood is a very attractive one, containing as it does no less than seven listings, each on a topic sure to claim attention and to arouse discussion. As a prelude to the regular papers will be the President's address, and as Mr. Britton is not only a man of practice but of convictions, it is safe to say that his annual message rsspecting the artificial lighting conditions of the Coast will be thorough and up-to-date. He has a fine sense of order, a royal share of courage and a full measure of perception which enabled him to bring order out of diversity in the lighting "states" of Oakland; and it is to him that much of the great success enjoyed by the Pacific Coast Gas Association is due. So it should be that during his active administration of the direction of the Pacific's current meeting, his efforts on its behalf shall be rewarded by a large attendance. There is, however, little doubt on that score. While the paper list in general, in so far as one may judge by noting the subjects proposed and the names of the authors, betokens matter of exceeding interest in each contribution, perhaps the greatest advance interest attaches to the "Report on International Congress of the Gas Industry, Paris, 1900," which is to be submitted by Secretary Grimwood, who represented in person the Pacific Coast Gas Association on the occasion of that conclave of the world's cardinal gas makers. Secretary Grimwood is an alert and capable observer, wherefore we look for a series of interesting chapters from him. The "Wrinkle" and "Experience" departments, under the respective editing of Mr. George H. Hollidge and Mr. O. M. Gregory, of course, can be confidently counted on to furnish a full quota of interesting matter. That the social features of the Convention will be flawless in providing for the entertainment of the Association's members and guests may not be mentioned here. Such entertainment is a certainty.

"FIELD'S ANALYSIS."—We are indebted to the courtesy of Mr. John W. Field, the compiler, for a copy of his "Thirty-second Analysis of the Accounts of the Principal Gas Undertakings in England, Scotland and Ireland," which analysis has to do with the records of the quoted companies for the year 1900. It needs no commendation at our hands, although we are led to say that its value and usefulness go on in continuing ratio as its age increases. There is no change in the priee of the volume ($6), and those who wish to secure copies of it may order through us.

NOTES.—The increase in output of gas at New Orleans, La., since the plant of the New Orleans Gas Light Company was taken over through leasehold by the New Orleans Lighting Company, amounts to quite 25 per cent. Gas stoves are being connected up in great numbers. Mr. Shelton and his associates evidently knew a good thing when they saw it.——The proprietors of the Watertown (N. Y.) Gas Light Company have notified the consumers that, from the 1st inst., the net price of gas, when paid at the Company's office, on or before the 15th day of the month in which the bill is dated and presented, will be $1.50 per 1,000 cubic feet for all purposes. Failure in prompt payment will incur a penalty of 10 cents per 1,000.——We are glad to say that Mr. L. L. Kellogg will serve as Manager of the Sioux City (Ia.) Gas and Electric Company, which Company is the result of the formal union of the properties of the Sioux City Gas Company and of the Sioux City Electric Company. Mr. Kellogg has been the governing spirit of the Sioux City Gas Company since 1886.——The gas, electric lighting and street railway interests of El Paso, Tex., have been consolidated. Messrs. Felix Martinez and B. F. Hammett, Jr., of El Paso, seem to be the principals in interest.——The electric lighting annex to the properties of the Grand Island (Neb.) Gas Company will be in readiness for operation the 1st of September.——The annual meeting of the Municipal Gas Company, of Albany, N. Y., will be held at 3 P.M. of the 16th inst.——The organization of the Brookfield (Mo.) Gas and Electric Light Company has been completed. The parties interested are residents of Macomb, Ills., and prominent in the list is Mr. H. H. Stephens, Superintendent of the Macomb Gas and Electric Light Company.

Some Differences Between British and Continental Gas Engineering.

[A paper read by MR. C. E. BRACKENBURY, at the May Meeting of the Institution of Gas Engineers.]

When the President asked me to contribute a paper to the "Proceedings" of the Institution, and suggested as a subject the contrasting of English and Continental gas practice, I naturally felt some diffidence in complying with the request, as there must be many other members more qualified than I am to deal with it. However, having been privileged to manage a Continental gas works, and being connected with a Continental gas undertaking, the subject was one in which I felt particular interest. Moreover, it was one to which attention has been frequently directed of late, by the remarks of our ex-President at the International Gas Congress; by visits abroad of deputations, engineers, and members of the Institution; and by the construction of entirely new works on the Continent—such as those at Zurich (to which reference will be made again), which have been fully described in the *Journal of Gas Lighting*.

The term "Continental" is wide embracing; and for the purposes of this paper, it may be well to limit somewhat its application. It is, of course, obvious that there may be many striking contrasts between Continental gas works themselves—stretching over such an immense area as that included between the works at Trondhjem in the north and Malta in the south; between those at Samara in the east, and Lisbon in the west; with temperatures varying from below freezing point to considerably over 100° F.; and with all the accompanying varieties of climate, people, habits and wants. The word is, therefore, used in a very limited way, and in its popular sense—applying to those more or less well beaten European countries of the Baedeker-armed tourist. Again, by "engineering," one includes not only the constructional considerations of gas works, but also the practice and procedure of gas manufacture.

In making any comprehensive survey of the differences existing between British and Continental gas engineering, it is unavoidable that generalities should be considered, to which there will always be found many exceptions. But it is hoped that the danger of drawing general deductions, and of making general comparisons from isolated and insufficient data, will be avoided.

At the outset one cannot help being struck by the fundamental difference between the training of the *personnel* of Continental and English gas works. The former consists in part of men who have graduated in recognized pub'ic engineering schools, who, as likely as not, did not enter a gas works gates until they had received their qualifying diploma at an age when the British pupil is considered to have finished his course, and begins for the first time to find that he has yet everything to learn in his profession. The latter's earlier training, being more haphazard and less systematic, scientific and thorough in the grounding of those subjects applicable to his career, though boasted of as being so practical, only leaves him at some disadvantage compared with the Continental student. Partly, no doubt, as a consequence of the better technical education received by the Continental engineer, his scientific status and social standing are far above those of his English colleague.

Even among the class of draughtsmen, it cannot be doubted by any who have been accustomed to examine drawings from each side of the Channel, that those from the other side show sounder training, wider accomplishments and better effect. Needless to say, they are all drawn and dimensioned on the metric system. As an outcome of the higher technical training of both chiefs and assistants, the modern gas works abroad show a somewhat more studied understanding of the problems to be solved; a rather more careful calculation of ways and means; and a little more exact proportion in the plant. English works, nevertheless, still excel in directness of purpose, simplicity of apparatus and thoroughness of workmanship. By grafting on to British methods, however, something of the spirit of the Continental engineer, will the future of the gas profession at home be made more secure and bright.

In one other direction are light and leading to be found over the water; and that is in the more artistic treatment of gas works than is to be seen here. What has art to do with gas engineering, it may be asked? But the latter is only the mechanical expression of the former, without its imaginative appeal; and it is simply because Continental engineers, generally speaking, have a more innate æsthetic sense than we Englishmen, that they naturally produce more attractive works. It is surely better to build a retort house both beautiful and practical, than one that is the latter only. The utility of an article is no excuse for its ugliness. Expense, fortunately, does not enter into the question at all; for a pleasing building need not cost any more than a plain one. And

even if it did, something would have to be set apart for "moral and intellectual" considerations. It is thus that the fine *façade* of the retort house, and other buildings of the new gas works at Vienna, have achieved the distinction of being reproduced on the pictorial postcards of that city's ornaments—not that this, however, in itself is any guarantee of artistic success. But can anyone imagine the same compliment being accorded to any English gas works, with their grossly utilitarian and hideous houses? The author has, it is just to say, heard of one works in England, where the retort houses were inspired by an exhibit in the South Kensington Museum, which have proved both useful and ornamental.

It has to be conceded, then, that Continental gas works lead us in this matter of architecture and artistic taste. They further show it in the general arrangement of the buildings, in the coloring adopted, and in the neat finish of ironwork and apparatus. In many instances, of course, the works are so situated that great advantage can be taken of natural verdure, trees, and fertility of soil; and thus the relief of freshness and of variety is easily gained. Even, however, where there are not these natural advantages, the writer believes that a little cultivation both of taste and of soil, and some little effort in this direction in dull English works, would not be altogether wasted. But apart from this, there is certainly no excuse for the dirt and untidiness—not to say downright dilapidation—that are sometimes to be seen. Cleanliness and economy go hand in hand; and as we pride ourselves (erroneously in many cases) on the latter, let us look to the former, which is far more frequently met with in works abroad than at home. For our credit's sake, however, some well built and well kept British gas works must not be overlooked.

It must be remembered that, although the previously mentioned characteristics are almost invariably found in Continental municipal gas works, they are also not wanting in very many works owned by companies, whose property may lapse to the town authorities at the end of more or less limited and uncertain concessions. That they attend to these matters in face of the unstable conditions of their undertakings, as against the greater security and permanency in England, is much to their credit, and further shows the economic advantage of so doing.

There are other general comparisons that will suggest themselves, but which need not be dwelt upon. Among them are the lower cost of labor on the Continent, and the longer hours of work; the usual shifts being 12 hours, though the author knows of one agricultural district, where the stokers prefer to work even for 24 hours on alternate days. What a contrast to an 8-hour day!

Passing on to the consideration of particular items of comparison, there is perhaps not very much to be said as to the methods of receiving, storing, and handling coal and coke. Mechanical means of doing this are rather more general in England, with a decided tendency to become still more so, though one might say that the more perfect and complete installations (at least with regard to coal) are to be found on the Continent, where usually far larger stocks of both materials have to be provided for. In many instances, entirely automatic machinery, in conjunction with sloping coal store flooring, has been introduced; and the interesting description of the Zurich arrangement will be fresh in mind.

Although English engineers may claim priority in the conveying of hot coke, yet the practical success of the De Brouwer chain must not pass unnoticed. There are signs, however, that even this is being greatly improved upon by English makers.

The extensive use of the Monier system of construction—as employed, for example, in the foundations and subways for conveyors, etc., of the Zurich works—may here be mentioned; and its successful adoption for some years past on the Continent may be noted.

Within the retort house walls there are several points of difference between English and Continental practice. The regenerative furnace is more generally adopted abroad than it is as yet among us. Even in many very small works on the Continent, one finds the most modern of regenerative furnaces—no doubt in consequence of the dearness of fuel. The more usual system is that known as double recuperation; while in England simple recuperation is more popular. The former is certainly more economical in working; and undoubtedly more expensive in first cost. But the Continental engineer seems more ready to sink his capital in the best furnaces obtainable than his English colleague—prompted, as stated, by considerations of the value of fuel. Higher heats are also the rule, and slightly larger, or more frequent, charges are adopted; so that a much greater proportionate make of gas per ton of coal carbonized is reached than is customary with us. Outside producers, serving generally only one setting, but sometimes two, are on the whole more usual in Continental works; it being thought that the durability of the producers is thereby increased, their filling more easily accomplished, and their production of carbon monoxide more regular. Be these things as they may, there are some indications that inside producers are gaining in favor. The use of blocks in the building of retort settings is more usual on the Continent than in England; and they are frequently made on the gas works themselves from ground and re-ground old fireclay material. Considerable economy is thus secured, and thoroughly satisfactory work results.

Continental settings are often single; and where they are back to back, the retorts are almost always ended ones, in striking contrast to English practice. Through retorts, with all their attendant advantages, even where originally placed, have, in the writer's experience, been done away with, chiefly owing to inability of the stokers to manage them, and because of the greater liability of ascension pipes to become stopped up. Continental retorts naturally vary very much in shape, just as do English ones; but a typical example, arrived at after exhaustive trials and considerable expenditure by the Paris Gas Company, is of shallow Ω-section, with curved bottom. It is 65 cm. wide, by 35 cm. deep, or about 25½ inches wide and 13¾ inches deep. Generally speaking, the characteristic features of Continental retorts may be described as being wider and shallower in cross section; their length being usually about 3 meters, or 10 feet. The writer has proved them to be as good "carbonizers" as can be found. Nine is a favorite number of retorts to set, in 3 horizontal rows, in a bed; though 8 are frequently seen. Notwithstanding the higher heats, no serious drawback seems to have been experienced with the middle retorts, such as has apparently troubled English engineers, judging from the frequency of finding only seven, and sometimes even six, retorts in a setting.

The cross section of the typical Continental retort cited, has perhaps militated against the aboption of self sealing lids; but these are now in process of becoming as general abroad as at home. Hydraulic mains are, one is inclined to think, rather more elaborately made and set on the Continent; a very usual form being known as "breech loading"—that is, provided with a cleaning out pocket along the whole length of the main. This is perhaps the result of carbonizing at higher heats, with its attendant troubles. A form of hydraulic main used, the writer believes, principally in Germany, is made with two or three internal division plates placed longitudinally, so that the gas has to traverse the length of the main more than once on its way to the outlet. Also, the ascension pipes are often of far greater length; and the bridge pieces in some cases having cooling ribs cast on them. Mention may further just be made of the single self sealing lid that is often adopted at the top of the ascension pipes.

In comparing the 96,000 lineal feet of inclined retorts already erected in this country (to be largely increased unber the guidance of our President) with the 84,000 feet put up on the Continent, there is one important fact, apparently not generally known, to be borne in mind—namely, that practically the whole of the latter has been partly designed and entirely carried out by a single firm of contractors, owing to the fortunate or unfortunate influence, as the case may be, of patent laws and rights. It will be easily understood from this that, to a large extent, the individuality (if the term may be used) of the different installations under different engineers has become lost, or at least greatly diminished. In England, on the other hand, each engineer has been at liberty to work out his own salvation, or the reverse; and the consequence is the many divergent views, both as to general principles and particular details, with which we are all familiar. Some of the foreign patent rights, however, have recently expired, and others are about to; so that we may look forward to the various personalities of Continental gas engineers soon being given full expression for the first time, as regards inclined retorts. Under these circumstances, therefore, it is hardly fair, or of much value, to compare generally inclined retorts on the Continent with those in England; for, as stated, the examples of the former are not indigenous of the soil, so to speak. This opportunity may be taken, however, to refute a recent American assertion (one cannot but believe based on an imperfect acquaintance with the facts of the case) that "in Germany the development is highest, and a settled standard has seemingly been reached." And again: "Germany has made up its mind, both as to what it wants and how to build it, and is far in advance on the question." This last statement the author does not accept as a fact; and in the light of what has been said as to the monopolist aspect of the case, the "seeming standard" will be easily explained. In fact, that such a large number of installations of inclined retorts should have been put up on the Continent under the circumstances, is simply evidence of the great value of their principle; so that engineers said: "We had better put up such as we can get, than go without altogether."

Of course, the most striking difference between the Continental in-

clined retort installation and the English one is in the length of the retort. At Zurich, for instance, the retorts are only 3.50 meters, or less than 11 feet 6 inches long; and in other cases, they are about 4.50 meters, or 15 feet long. They have never as yet been made on the Continent 20 feet long (the general English length); but the writer is aware of two Continental countries in which this length will, in all probability, be adopted for future installations. The reason for the shorter length of inclined retort on the Continent has been asked more than once; and the answer is partly to be found in the facts previously stated, combined probably with a fear as to the complete success of satisfactorily heating a 20-feet length, and a disinclination to depart from the original type of furnace and other details.

Other contrasts are the arrangement of 9 retorts per bed, and the more usual outside producers and main flues. In some points, from the beginning, the Continental builders have been following a wiser course than English engineers. Among them is the span given to the arches, which has generally been, for a bed of 9's, 3 meters, or nearly 10 feet, compared with the English figure (up till recently) of 9 feet or less. The writer has recently designed a bench, with a span of arch 3.25 meters, or 10 feet 8 inches, which he believes to be the maximum yet adopted. The strength of piers has also always been greater in Continental installations; being 75 centimeters, or nearly 2 feet 6 inches, against the weaker English thickness of 1 foot 6 inches. Abroad it is also very usual to leave a clear space above the firebrick arch for free expansion; and there are other smaller details of comparison.

But it is in the system of charging the retorts that a really fundamental difference of principle occurs. Here in England we have, generally, overhead hoppers for the whole length of the bench, as is indeed necessitated by the usual arrangement of a fixed measuring chamber, containing the charge of coal, over each vertical tier of retorts. The operator in this case has merely to pull a lever to charge the retort. But on the Continent the storage tanks are not often continuous; and the charge is suspended in a movable kind of coal scuttle shoot, so that there is the additional labor of running it to and fro, loaded and unloaded. In the former arrangement, as usually adopted, the operator is compelled to put into the retort the whole of the measured charge; whereas in the latter he can put in as much or as little as he chooses. What are the advantages of the two systems as labor saving appliances, and which principle—compulsion or freedom—is the correct and practical one to apply to gas works stokers? Without marshalling the arguments *pro* and *con*, which hardly come within the scope of this paper, the writer's opinion, from knowledge of both systems, is that the English practice of compulsion (contiuous hoppers, measuring chambers, sure feeds, and single levers) is the only sound and secure one.

While not admitting that the Continental installations of inclined retorts, erected under the conditions described, are equal on the whole to those erected by many English engineers, yet the author wishes to pay a tribute to the many admirable features of the German (for they are all German designs), and the thoroughness and excellence of their execution—particularly as regards the quality of materials used, and the construction of the furnace.

British makers hold practically a world wide monopoly in machinery for charging and drawing horizontal retorts; and every meed of praise should be accorded to its inventors for the admirable and satisfactory results of their labors and ingenuity—thus in one department at least keeping a strong lead over all comers. There is still much to be done on the Continent in the introduction of stoking machinery; and the author was glad to be connected with the first installation in one country, which has recently adopted a second plant. It is to be hoped that this economical means of carbonizing will soon be further extended in Continental gas works, where the existing settings are suitable.

Leaving now the carbonizing department, and turning to the accessory apparatus, we find the general sequence of manufacture to be approximately the same. There are particular items to notice, however, that will be dealt with in due order. Modern Continental practice undoubtedly is to adopt large atmospheric cooling (as they use better named than "foul") mains, before the exhauster, and to use water cooled condensers preferably after. Again, the whole tendency to-day on the Continent is to abolish high apparatus in favor of that equally efficient but low—to do away with vertical condensers and tower scrubbers, and to adopt horizontal ones and mechanical washers. This is, of course, the result of greater extremes of temperature than are known in England, and the consequent necessity of protecting all such plant from the effects of weather.

The contrast to be noted in the exhausting plant is chiefly the more general Continental use of Anderson exhausters; and where Beale's are to be found, they are generally of the old two blade type. A few of the latest Donkin patterns have been introduced; but some preference still seems to be given to reciprocating machines, on the score of durability and facility of repair.

After the exhauster is placed almost invariably a friction condenser or tar extractor, of a form hardly ever seen in this country—popularly known as the "Pelouze," from the name of its inventors, MM. Pelouze and Audouin. It is often placed in the exhauster room itself, as to be of maximum efficiency it requires a certain amount of warmth. It is a most satisfactory and clean apparatus, occupying but small space, and effectively removing all traces of tar from the gas.

Water condensers are preferred abroad to atmospheric ones, on account of the greater control they afford over the temperature of the gas, and as the coolest of water can generally be obtained in the hottest of summers. Mention may also be made of another type of condenser of Continental origin, sometimes called a condenser scrubber, from the fact that the outside of the water tubes is sprinkled with ammoniacal liquor. Such condensers on the Reutter system have been put at the Zurich new works.

As already stated, washer scrubbers are held in great favor on the Continent, among other reasons, because they can be so easily roofed over, and owing to the ease with which they can be regulated to the work to be done, and the small amount of low pressure pumping required. The makers abroad turn out a really first-class machine in every respect, with several small mechanical improvements in details.

Although steam is, of course, used for motive power, the extensive adoption of electricity in many works, as an auxiliary, for a variety of purposes, must be noticed. There does not appear to be on the Continent the objection to its presence within the precincts of a gas works that there seems to be in England. For lighting, it is especially applicable to gas works; as is evidenced by there being nearly four times as many electrical lamps as gas burners at the Zurich works. For driving isolated motors, it is obviously convenient, as shown by many instances—such as, for example, the portable elevator for coke seen at the Clichy works. There are gas works, nevertheless, in England, where electricity is produced side by side with gas, and yet where no effort is made that the one may assist the other.

There does not seem to be any striking contrast in boiler practice, except perhaps that, owing to the greater value of fuel abroad, a cheaper kind—such as coke breeze, etc.—with forced draught, has long been more generally used.

The most noticeable feature in connection with purifying plant is the absence on the Continent of boxes of any great area. Small purifiers are preferred even in large works, on the assumption that there is greater ease in manipulating the material, though the drawbacks of this method of working, both chemical and mechanical, are now better understood. The author has recently been connected with the designing of eight 35 feet square boxes, dry sealed, with indiarubber luting, which—both as regards size and system—are something of a novelty abroad. They are placed on a stage flooring, and filled with lime and oxide by means of jib cranes for the former, and elevators, conveyors and shoots for the latter. A somewhat favorite Continental system of handling purifying material is that adopted at Zurich, consisting of a single line of overhead rail with tip buckets.

Of course, the conditions abroad with reference to the extent of purification required are not nearly so onerous and exacting as generally at home. The most customary stipulation is that the sulphuretted hydrogen shall be completely taken out of the gas; but the removal of the other sulphur compounds and carbonic acid is not insisted upon. As a consequence, oxide of iron is the material most largely used—in many cases exclusively. It is generally employed in the form of Laming material, and is often made locally on the gas works.

The smallness of size and largeness of number of the purifiers are no doubt partly responsible for the extensive adoption of ordinary dry inlet and outlet valves. The old hydraulic center valves are sometimes used; and an admirable dry center valve of Continental origin, but of English modification, (the "Weck"), may be mentioned.

The castings of Continental station meters are almost invariably of cylindrical form; and it is somewhat curious that large English works should almost equally invariably adopt the rectangular type, often expending upon it a considerable amount of ornamentation. The modern Continental practice of replacing the usual meter dials by "jumping" figures, recording the actual amount of gas passed, may just be noted.

With gasholders as with purifiers, the average smallness of size adopted on the Continent is remarkable; it being only within a comparatively recent period that 3-lift holders have been erected to any extent. A detail of construction in making the side sheets break joint is very old, and incidentally may be observed. Gasholders within houses are sometimes

met with, and are generally due to local and climatic considerations.

In this department of gas engineering (which offers considerable scope for constructional ability on the part of the engineer), English makers of gasholders have led and taught the world. But there is no disguising the fact that in this, as in other branches of manufacture and commerce, their supremacy is seriously threatened. Continental competitors are springing up, are profiting by our experience, are improving upon our ideas, are surpassing our workmanship, and are adapting themselves to local requirements. English manufacturers of gasholders and gas plant should, therefore, be on the alert; and by adopting every possible improvement, they can combat the competition and overcome the severe handicap of transport and customs duties.

Station governors abroad are not so generally of such finish, accuracy and sensitiveness as those at home; and there seem to be lacking the many automatic refinements that are often found in English ones.

From what has been said on purification, it will be understood that the illuminating power of Continental gas is generally speaking much lower than that sent out from British works. For this reason, among others, there is not, therefore, that necessity abroad for the adoption of carburetted water gas plant and other enriching apparatus, as there is in England. Besides this, in some countries, petroleum oil is a government monopoly; and its import duty doubles or trebles its original cost, and places it out of comparison with cannel and boghead enrichment. There are, however, localities where such drawbacks do not exist, and where plant is in successful operation. The increasing adoption, in suitable cases, of benzol for enriching purposes, and apparatus for the prevention of naphthaline deposits, may be alluded to.

Having reviewed some of the points of contrast offered between the manufacturing plant of coal gas in British and Continental works, reference may now very briefly be made to comparisons in the treatment of residuals, labor and lighting.

A greater number of small works is to be found abroad than at home, in which the manufacture of sulphate of ammonia, or some concentration of ammonia, has for many years been carried on. Then, again, the recovery of cyanogen from the oxide of iron used in the purifiers, has been largely practiced for a considerable time past, and also its direct absorption from the gas has been, perhaps, of earlier date, and of greater extent.

Further, in many gas works the manufacture of briquettes has been found advisable; and, generally, the writer thinks it may be stated that more attention has been paid in some particulars to bye-products on the Continent than in England. In this connection one may say that properly fitted and properly used laboratories are not quite so rare in Continental works as they (unfortunately) are in British.

Now, with regard to the treatment of labor. It is more than usually difficult to generalize with any degree of accuracy on this question. There are Continental gas works where the employees were unduly pampered, and their moral stamina thereby weakened; and on the other hand, works may be found where the stokers and laborers are not treated in a proper spirit of fairness and consideration. Between these two extremes one is glad to note that, in the large majority of cases, a sound balance is kept between the one and the other. In those countries where the emancipation of the working classes is but half, or but recently, accomplished, there is naturally a tendency for them to err in the way of extravagant ideas and demands, and to lose temporarily their sense of proportion. And though some may rightly fear the growing evidence abroad of the power of labor to capture municipal seats, and the possibility of the abuse of its position and privileges, yet the author, while safeguarding all interests by the adoption of the most economical and mechanical means of manufacture, believes in the evental recognition of mutual rights, and the peaceful blending of apparently conflicting interests.

Baths, lavatories, mess rooms, and (at Zurich) "first aid" room, restaurant, and workmen's dwellings—though they have apparently forgotten the important educational effect of a technical works library—these are the outward signs of the modern progressive spirit. The higher wages of English gas workers are more wastefully and more foolishly spent than the lower pay of their Continental fellows, and withal they lack that innate sense of courtesy, politeness and even cleanliness that is so generally remarked abroad.

In the department of piping, mention may be made of the old use of Chameroy pipes, still often found in many Continental towns, and of the present extensive adoption in some countries of the Lavril pipe and indiarubber joint. Where there is a straight long length of main to be laid, the convenience, cheapness and speed of the latter system would seem to offer certain advantages over the far more usual method of lead jointing. In some towns subways under both foot pavements have been insisted upon for gas and other mains.

The much discussed question of street lamp posts, lanterns and illumination in England leaves but little further to be said. The deplorable neglect, the hideous unsightliness, the unsuitable pattern, and the other inadequacy of the whole, have been emphasized again and again. Care might at least be taken, all the same, to offend the eye as little as possible, by seeing that the ugly things be placed perpendicularly, and that the dirty lanterns be fixed squarely and truly, as is so rarely the case—in North London at all events. Some well considered steps have been taken toward improvement in South London, and in a few other instances—one being a small cathedral town in the west of England, where the writer, on some holiday ramblings, was agreeably surprised by graceful lamp posts and incandescent brilliancy. We are, however, sadly behind the times and the Continent in this respect, as our Past-President (Mr. Marshall) once took the trouble to show us in a very pleasing and practical way.

Abuse of the present state of public darkness has been general enough; and the author cannot help thinking that if something in the shape of actual organized improvement were simultaneously put forward by the gas companies and corporations represented in the Institution—particularly with the aid of high pressure burners—some upward public movement might result.

Incandescent lighting on the Continent, as is well known, is far more general than at home, encouraged abroad by the greater cheapness of the burners and mantles, and in part, also, by the gas being usually both dearer and of lower illuminating power. As there is evidence that we are following in the sensible direction of replacing candles by calories, it may be hoped that in the future, by energetic endeavor, this leeway may be made up.

The Continental trade in consumers' meters was originally built up by English firms, descendants of which may still be found scattered about Europe. The meters abroad are usually wet—in some countries these being the only ones permissible, though a commencement has been made to adopt dry ones, as more generally used in England. Prepayment meters were far later in being introduced on the Continent, and are still suffering from initiatory difficulties.

Gas stoves for cooking are widely used abroad, though for heating, coke, charcoal and wood, burned in suitable slow combustion stoves, are the fuels in favor; coal being rightly undreamt of in this respect. The high price of gas, as well as the large consumption required, wedded to inartistic designs, tend to prevent the extension abroad of gas stoves, just as they militate against their adoption at home—thus retarding the day of clean cities. Gas engines are extending pretty generally everywhere. To sum up the more striking of the broad differences between British and Continental gas engineering, what do we find? Generally in Continental works a more pleasant and tidy appearance, and greater architectural and artistic effect; a firmer basis on scientific principles; and a more careful calculation of requirements, with a staff more thoroughly equipped in technical and mathematical data.

British works convey the impression of being mean, and often unnecessarily ugly and dirty. They impress one as having gradually grown from a primordial practical germ, while Continental works strike one as having evolved from a later tissue of engineering calculi. Abroad, freer scope is given to chemists and experimenters; and their scientifically prosecuted investigations lead to better results in the higher branches of research than can be shown by inquirers at home. Continental works are the more sensitive to answer to the calls of modern necessities; while British works plod ponderously along in their old conservative methods. British gas works have, however, the enormous advantage of the finest raw material, both in men and in matter, to be found in the world. The former only require a little proper guidance, suitable technical instruction and some small encouragement. The latter needs but scientific investigation and mechanical manipulation.

Our works are the offspring of the practical genius of the eminent pioneers of the gas industry; and they are stamped with their original earnestness, fitness, thoroughness, courage and character, and as such they are unapproached by any the world over. But as the signs of the times show that there is a national awakening to the fact that our general industrial life is threatened, and as there is an evident desire to examine into the weak points of our machinery and to improve it, so may it be said of the British gas industry—attacked likewise by many competitors—that it is determined to bestir itself, to throw off the lethargy of monopoly, and to profit by every means in its power so as best to utilize its raw material, to cheapen its commodity, and to take its proper place in the foremost rank of the benefits conferred upon mankind by British engineering.

Oil Engine Trials at Cardiff.[1]

In 1890 the Royal Agricultural Society of England held trials of oil engines at Plymouth, and four years later (1894) they held similar trials at Cambridge. The first trials were in the early days of petroleum motors, and only brought out two competitors. The Cambridge trials were well attended, and their results were accepted for a long time as the standards of efficiency and economy in regard to such engines. But advances have been made since then, and in connection with the Show to be held at Cardiff next week the Royal Agricultural Society again offers prizes for the best engines that are presented for the verdict of its judges. The prizes are $200 and $100 for portable oil engines not exceeding 15-brake horse power, and similar sums for agricultural locomotive oil engines not exceeding 20-brake horse power. There were eight entries of portable gas engines, of which six are now actually on the ground and under tent, but no agricultural locomotives have been entered. Evidently makers realize that the oil engine is not sufficiently elastic to comply with all the demands that are made on an agricultural locomotive. They would doubtless give a fair account of themselves on the road, but when they were required to get in and out of stack yards, and to make their way over soft ground that had no pretensions to be a road at all, they would most probably fail. It is a ***sine qua non*** with a farm locomotive that it shall be able to pull itself out of any difficulty, and up to the present there is no motive power, except steam, which has satisfactorily complied with this condition.

The judges at the present trials, which commenced on Wednesday last, and are still in progress, are Prof. Ewing and Mr. J. G. Mair-Rumley. It would have been difficult to hit upon any two men that represented the motto of the Society, "Science with Practice," more completely. It is not that one stands for science and the other for practice, but each stands for both, although in varying degrees. Neither needs any introduction to our readers, but we may recall the fact that Mr. Mair-Rumley, when known as Mr. Mair, of the firm of Messrs. Simpson & Co., of Grosvenor road, Pimlico, was among the first of our manufacturing engineers to make a scientific study of steam engine economy. At a time when the method of making rigorous tests was scarcely understood, he undertook dozens, and he was always ready to accept specifications for steam engines including guarantees of economy, when they were drawn within the limits of possibility. Prof. Ewing is also widely known as an expert in engine testing, in addition to being an authority on thermo dynamics.

The following is the list of competitors at the trials: Messrs. Crossley & Co., Limited, Manchester; Messrs. Nayler & Co., Hereford; Messrs. J. & F. Howard, Bedford; Messrs. R. Cundall & Sons, Limited, Shipley, Yorks; Messrs. E. Humphries & Co., Limited, Pershore; Messrs. Ruston, Proctor & Co., Limited, Lincoln.

The only one of these firms which took part in the Cambridge trials was, if our memory serves us, Messrs. Crossley Brothers. All the others have entered into manufacture of oil engines since that date; while of those who appeared at Cambridge, some are resting on their laurels, and others have lost their enthusiasm for competitive trials, or have retired altogether from what is a difficult subject. At the conclusion of the present tests we shall learn what has been the progress of the last nine years. The trials extend over several days. They commence with 3 days' run, of 10 hours per day, at the declared horse power, and then will come half power and light load tests. At the time of writing Royal Daylight oil is being used; but this is to be afterwards changed to Russoline. The specific gravities of these oils are .79 and .82 respectively, and the change will involve some difficulty to such of the competitors as have tuned their engines to one kind of oil, and have not means for readily changing to another kind. We hope in our next issue to give the results of the trials, and in the meantime we give a general description of the engines on the ground.

Messrs. Cundall and Co. have never yet exhibited a portable engine, and consequently their present appearance in a new field is full of interest. They show an engine of 15-brake horse power, with a cylinder 10 inches in diameter by 18-inch stroke. Its salient feature is that it has two blue flame lamps—one for the ignition tube and the other for the vaporizer. This latter is not used at heavy loads when there is the certainty that the vaporizer will be sufficiently hot to secure ignition. At light loads, and at meal times, the second lamp is brought into operation, and all chance of unexpected stoppage is prevented. These lamps are both supplied with oil by the same pump which feeds the vaporizer, and there is a valve which regulates both simultaneously, in addition to a valve for cutting out the second lamp. For the engine the oil is delivered to a small cistern, in which is a cup, the rim of which can be raised and lowered by a screw to vary its capacity. There is a valve at the bottom of this cup, and, each time an explosion is to take place, this valve is opened by the action of a hit add miss motion controlled by the governor. The contents of the cup are sucked through the vaporizer into the cylinder. All oil which is pumped in excess of requirements runs back into the tank. The vapor valve is opened by a cam, while air valve is opened by the suction, and the exhaust valve by a cam.

The engine is built on a cast iron bed plate, and this is carried by two H-beams. The oil tank is beneath the cylinder, and the water tank beneath the crank shaft. A rotary pump forces the water through the jacket, and then delivers it through perforated pipes on to a sheet iron canopy which covers the whole of the engine, and forms a general protection from the weather. The water is cooled in this way, and finds its way back to the tank.

Messrs. Humphries and Company are not new comers at the Royal Show. Their oil engines have been seen there for many years, and their peculiar features have already been described in our columns. It will be remembered that the engine is one of the "lampless" variety, depending for the ignition of the charge on the heat of the combustion chamber. Further, it has no side shaft. The valves are worked from a crank pin in a gear wheel driven at half the speed of the crank shaft. The connecting rod drives a slide, and the necessary "dwell" is obtained by causing this slide to operate the valves at each end of its stroke, the remainder of the stroke being idle. The slide operates a rack shaft, and this opens the exhaust valve and the air valve alternately. The oil pump is worked by a cam on the gear wheel, and delivers its oil direct into the cylinder. Here it impinges on a deflecting plate, which directs it into a cast iron pocket, which is maintained at a dull red heat, and effects its immediate combustion. The amount of oil is controlled by the governor, which opens a by-pass valve, more or less, and lets a part of the oil flow back to the tank. The water pump is worked by an eccentric on the crank shaft, and the hot water is finally delivered to a cooler at the base of the funnel. The engine is working at 12½-brake horse power, and has a cylinder 10 inches in diameter by 15-inch stroke. The engine unfortunately suffered some injury in transmit, and this has interfered with its good working so far.

Messrs. Nayler and Company, of Hereford, have brought to the trials an engine in which simplicity of construction is a noticeable feature. They have kept down the number of parts to what is just necessary, and have not attempted to buy economy at the expense of complication. Their engine has only 2 valves—an air valve and an exhaust valve, the latter being under the control of the governor, and being held open when the speed of the engine is above the normal. When the exhaust valve is open there is no vacuum formed behind the piston, and consequently there is no vapor drawn in from the vaporizer and no explosion. This is the simplest method of governing, and is consequently popular. The oil runs by gravity to the vaporizer, dispensing with a pump. To this end the oil tank is placed above the cylinder, and a stand is provided on the bed to carry a reserve store. The oil tank delivers into a small cistern by a "chicken feed," the well known device for maintaining liquid at a constant level. From this cistern the oil is sucked to the vaporizer by the vacuum caused by the piston, the amount of oil being regulated by a screw plug in the pipe. The vaporizer is kept hot by a lamp fed with oil from a separate supply placed above the tank from which the engine is fed, the heat being sufficient to maintain a blue flame, after the lamp has had a preliminary heating by a hand lamp. The ignition tube is kept hot by the same lamp.

The declared power of Messrs. Nayler's engine is 6-brake horse power, the cylinder being 7¾-inch in diameter by 15-inch stroke. This cylinder is mounted directly on the frames, the weight of a cast iron bed being saved. The frame is of two channel irons, carrying below them a tank for water. A pump, worked by an eccentric on a side shaft, lifts the water from the tank, and forces it through the cylinder jacket. From this it is delivered over a cone of wire gauze situated over the fore carriage and in front of the funnel. The interior of this cone is connected to the funnel, up which there is a sharp draught caused by the exhaust. The result of this arrangement is that while water is flowing in a thin sheet down the cone, air is being drawn through it, and so the water suffers a rapid cooling, partly by conduction and partly by evaporation. At the commencement of the trials on Wednesday the engine started well and ran without incident.

Messrs. J. and F. Howard have shown both fixed and portable oil engines at the Royal Show for several years, and we have often been able to speak in terms of commendation of their design. This year they have not had to introduce any new features in order to bring the engine up to the point at which it could enter into competition with other makers, and they therefore go into the contest with the confidence en-

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gendered by a long experience. Their motor is working at 12-brake horse power, and running with an ease and regularity which must be very satisfactory to those in charge of it. It is one of those which have a separate lamp to heat the vaporizer and the ignition tube, and which do not depend on the temperature of the explosion chamber to insure the combustion of the charge. Such engines will work equally well both with light and heavy loads, and can be stopped at meal times with the certainty that they will start without delay when the bell rings.

There are two cams on the side shaft—one works the exhaust valve; the other operates the vapor valve and the oil pumps; but between the cam and its work there is interposed a hit-and-miss motion controlled by the governor. Consequently, when the engine is running above speed, oil is not pumped into the vaporizer, and the vapor valve is not opened to the cylinder. The two oil pumps have different offices—one pumps oil into an air vessel for the supply of the lamp, which, of course, is fed under pressure; the other pumps oil to the vaporizer. The down stroke is effected positively by the cam, and the return stroke by a spring. The limit of the return stroke is fixed by an adjustable stop. When more oil per stroke is required, this stop is raised, and the stroke of the pump lengthened; and conversely, when less oil is needed, the stop is screwed down and the stroke shortened. The air valve is opened by the suction in the cylinder, and has no cam for its manipulation. There is one feature of the ignition tube which is worthy of notice. At its outer end there is a hollow cast iron ball, the interior of which is in free communication with the interior of the tube. Before each explosion this ball is filled with a charge at pressure, and when the ignition takes place there is a sudden release, projecting the flame well into the combustion chamber, and keeping the mouth of the tube free of all deposit.

Messrs. Howard's engine is built on a cast iron bed plate, and this is mounted on two steel channels, which carry the rear axle and the fore carriage. The oil tank is placed beneath the cylinder between the channels, and the water tank at the fore end. The water is forced through the jacket by a pump worked by an eccentric on the crank shaft, and it is finally delivered to a cooler. At the top of this there is a rotating sprayer, which distributes the drops over a number of boards built up into a chequer work. The water trickles down these boards, and through the interstices a strong draught of air is drawn by the inductive action of the blast. By this means the water is kept cool, and it is only the quantity lost by evaporation that needs to be renewed.

This is the first time that Messrs. Ruston, Proctor and Company, Limited, of Lincoln, have brought a portable oil engine to a Royal Show. This engine is worthy of their reputation, and has a well designed workmanlike appearance. It started without difficulty and ran very sweetly, requiring no attention. Its declared load was 10½ to 12½-brake horse power on Royal Daylight oil, and 12 to 14-brake horse power on Russoline, the cylinder being 9½-inch in diameter by 16-inch stroke. The feature to which the builders have devoted their special attention has been the avoidance of all adjustments by the man in charge. They have determined the exact conditions under which the engine will work best, and have crystallized these conditions in iron and steel, so that the attendant has no power to alter them. Whether he be ignorant, or, what is worse, conceited of his knowledge, he cannot alter anything except the air supply; and as far as could be seen in the first day's trial, there is no necessity that he should.

The engine is of the usual 4-cycle type, with the usual air and exhaust valves, and a vapor valve, which, together with the oil measuring apparatus, is under the control of a governor. The oil is elevated from a tank, situated between the channel irons which form the carriage of the engine, by a simple pump, without packing or delicate valves. It is raised to a measuring cistern above the engine. This cistern has an overflow orifice, and all oil not used runs back to the tank. The supply to the vaporizer is controlled by the governor. When a charge is required, a measured quantity—the amount of which cannot be varied by the attendant, however enthusiastic or officious he may be—is delivered down a pipe. The device by which this is accomplished is a very pretty piece of mechanism. The delivery pipe stands vertically in the measuring cistern, its mouth, which is finely chamfered, being above the oil lever. Around this pipe is a sliding bush, which at its upper end is bored out to a larger diameter than the pipe on which it slides. The annular space formed by this boring out contains the exact amount of oil for one charge, and when the bush is raised above the mouth of the supply pipe, this oil pours down the pipe into the vaporizer. This action takes place every time the governor brings the hit-and-miss device into operation, the bush being then raised above the top of the central supply tube.

The oil which passes down the supply tube is swept along to the vaporizer by a little air, which is admitted through small holes in the side of the cistern, and immediately before entering the vaporizer is joined by a further and larger supply of air; the mixture is then drawn through a spiral groove, and passing by the vapor valve, is admitted to the combustion chamber, where it is mixed with the main air supply to form the charge. The vaporizer is surrounded by an extension of the combustion chamber in which the explosions take place, and keep it hot enough to vaporize the oil.

Ignition is effected by an automatic ignition tube placed beneath the vaporizer, and opening at both ends to passages leading to the combustion chamber. After the vaporizer and ignition tube have been heated at starting by a single lamp, they are automatically kept at the temperature required by the heat of the explosions. The only adjustment in the hands of the attendant is the air cock, by means of which the mixture may be varied as required.

To facilitate starting the compression is let off, as is customary. There is, however, a special arrangement, forming the subject of a patent which has been applied for, to assist in this operation. It comprises an extra roller, with a screw thread inside it, as if it were a nut. This is placed on an extension of the exhaust lever pin, which is also threaded. By screwing the roller to the right extremity of this thread, the roller comes in line with a larger boss on the camshaft, and so holds open the exhaust valve. As the engine rotates the roller is revolved, and works towards the left hand end of the pin, passing in so doing—after a definite number of revolutions—from the non-compression cam to the half-compression cam. At this point the engine gets an explosion, and starts. In the course of a few more revolutions the roller is screwed automatically from engagement with the half-compression cam and put out of gear, the engine being then fully started. One man can start the engine with certainty without difficulty.

To suit the engine for different varieties of oil small covers are supplied, which fit on a branch from the cylinder. These covers project internally into the clearance space, and occupy more or less of it, according as greater or less compression is desired. The engine itself is on a cast iron bedplate, and this is mounted on a frame made of two channels. The oil tank is placed between the channels at the rear end, and has a capacity for 16 hours' work. The water tank is between and below the forward part of the channels, and holds 60 gallons. This water is circulated by a positive wheel pump, driven from the side shaft. It forces the water through the jacket, and delivers it to the cooling tower. The pump and wheels are both of brass, and there are no valves to get choked or out of order. The cooling tower contains a number of perforated boards, arranged spirally, on to which the water is sprayed; and a current of air is drawn through in the opposite direction by the inductive action of the exhaust. When the pump stops, all the water returns to the tank, and there is no danger of the cylinder being cracked by frost.

As we have already said, Messrs. Crossley's firm is the only one which appeared at the Cambridge Show, and now it appears with 7 years' experience added to that which gained it the second prize at the previous trials. The Crossley engine is representative of all that prolonged experience, ample capital and trained mechanical skill can accomplish, and its performance will be watched with intense interest. The finish for which the makers are celebrated, and the admirable workmanshtp resulting from the use of the best tools and the most complete methods, are evident to the spectator.

The thermo-dynamical conditions, of course, are not patent to the eye, and will only be revealed when the figures are got out, but nothing has been omitted that could add to the economy. The Crossley engine is of considerable size—15 brake horse power—so its thermal efficiency should be high. At this size the question of oil consumption becomes of more importance than in small engines. The value of the oil small engines burn cannot be large, and a few per cent. more or less is of little importance. It is the bill for attendance, repairs, depreciation and interest, that bulks most largely in this case; and increase of complexity is dearly purchased by a slight increase in the oil bill. But with larger engines the conditions are different, and hence we find that Messrs. Crossley provide air, vapor and exhaust valves all positively worked by the camshaft. They do not add a timing valve; that is a feature of their gas engines which is not found in their oil engines. The ignition and vaporization are affected by a lamp which burns always; it is fed by a separate pump, and insures that the combustion of the charge shall take place regularly both at light and heavy loads. A second pump supplies oil to the vaporizer, both pumps being worked from one eccentric. The oil is delivered to a timing cistern with an overflow leading back to the tank in the bed, and a measured quantity is delivered to the vaporizer every time the governor opens the vapor valve and allows the vacuum behind

the piston to suck in the oil. The arrangement by which this is effected is full of interest to the mechanic.

There are two tubes, together making a V, situated in the oil cistern, and always filled to a certain height. In the angle of the V is a valve, which controls the passage to the vaporizer, and when this valve is raised simultaneously with the vapor valve, the oil in the V tubes is sucked forward into the vaporizer. The amount can be varied by screwing a loosely fitting plug into one arm of the V, and in this way the richness of the mixture can be nicely adjusted.

The Crossley engine has no bedplate. The cylinder, which is 10 inches by 18 inches, is, with the combustion chamber and lamp, bolted to the two channels which form the frame, and the water tank is fixed between and below the same frame. At the fore end of the frame is the oil tank and the fore carriage. This comprises two castings capable of swiveling in relation to each other on a spherical joint, so that their front wheels can adjust themselves to the variations of the road without straining the axle. The water is pumped through the jacket by a plunger pump, and is delivered to a cooler built around the base of the funnel, and traversed by a sharp draught of air induced by that exhaust.

The particulars which we have given above of the oil engines now on the trial ground at Cardiff will show that the trials now in progress promise to be of exceptional interest. Next week we hope to be able to deal with the results of these experiments.

The Future of Acetylene Lighting.

[A "copyrighted" paper read at the meeting of the International Acetylene Association, Buffalo, N. Y.]

"The best of profits of the future is the past." So wrote Byron over 80 years ago. Others had expressed the same thought, and it has been well stated since, but the truth of the aphorism is more generally accepted today than ever before, and so it should not seem amiss if this discussion, in part, deals with ancient history.

Whatever may be said, the discriminating must note a paradox in the lighting industry. A new means of illumination serves to supplement or extend rather than destroy existing methods. Candles continue to be in large demand, even in cities with gas plants. Kerosene holds its own, and the use of electricity, particularly in arc lamps, has compelled neighboring shopkeepers to extend their lighting facilities and burn more of the old illuminants if they continue in the race for trade. Acetylene, by providing true, steady light, will compel the improvement of old methods, but cannot compel their downfall or abandonment. Even the daylight bringing prism window will not bring about a demand for the proper artificial illumination of gloomy interiors where the light of day can never be directed. The same spirit extends to the home, factory and church—good, better, best, are relative terms, not absolute. The ideal is usually the unattainable, but every acetylene light placed in general use is a little step toward the millennium.

The Field.—The field for acetylene is practically unlimited, and every day points the way to new spots that need but little cultivation to produce an abundant harvest in due season. For many years, perhaps always, the perfect conditions for the installation of acetylene apparatus will be found in isolated localities. With efficient, permitted generators large enough to light a small house, sold at $27 each "to the consumer," there are few farmers in the United States who cannot afford acetylene. Many of them will have it before many years elapse. The country storekeepers have been and are experimenting with various makeshifts, but this only proves that they are keenly alive to their need of better light, and those who are wise know that there can be no rest from this feverish search until they come into the acetylene fold. For many years acetylene must serve as the buffer between the dissatisfied user of gas or electricity from a central station and the more or less satisfied corporation striving to earn dividends. There will usually be little or no profit in this business, but there is often great glory. An exception may be made of those small towns where the autocrat in charge of the electric light plant runs his establishment according to rules and the calendar, ignoring the needs of his patrons. The inconvenience and loss in store or factory which result from the absence of electric lights (however excellent at night) on dark days and early evenings, as well as the annoyance in the home or entertainment hall which is deprived of current at an arbitrary hour at night, will become unpleasant memories when the rebellious victim rises in his wrath and installs acetylene, always ready to do his bidding.

Aids the Display of Goods.—Discriminating manufacturers and progressive merchants will come to realize that in many industrial operations and for displaying a large variety of goods the acetylene light is really indispensable. Electricity and mantles both fail to accomplish the wonderful results that follow the intelligent, expert application of this new, scarcely known servant.

The city home of luxury, hung with rich curtains and tapestries, adorned with frescoes or masterpieces of art, furnished with soft upholstery and rugs, offers an excellent opening for acetylene. Inquiry among owners develops the fact that the products of combustion from common gas often produce disastrous results in the destruction of these beautiful interiors. As a rule, the refuge of such a householder is electric light, which as usually furnished is utterly unfit for use as a reading or working light in the home. These men need light, can afford to pay for it, and when they appreciate the situation, will have acetylene.

Students and elderly people whose eyes are impaired by long straining under dim or unsteady lights make up another class of future users of acetylene, whether in or out of town. In many instances a small generator furnishing a few lights for a special purpose will be the forerunner of a complete surrender by its devotees—won over by a rare combination of beauty and utility.

Apart from the lighting of ordinary interiors, special application of acetylene will cut no small figure in its introduction to general use. The phenomenal diffusive quality of this light will cause it to be adopted in every compactly arranged village as the only illuminant for streets and other public purposes.

For Lighthouses and Signal Work.—Experiments now complete have proven the usefulness of acetylene for lighthouses, range lights and beacons, for which it is admirably adapted, not only on account of the penetrating qualities of the light, but also because it is feasible to maintain lights at points difficult of access by making monthly visits at opportune times, avoiding the daily attendance which too often involves the loss of life and interruption of the service. Akin to this is the application of acetylene to searchlights and signals, which will reduce the perils of navigation on inland as well as salt water. On land, too, such lights have their place, and will be applied to advertising, display and show purposes as soon as opportunity is given to prove their effectiveness. The acetylene stereopticon has become an everyday article of sale, and the day may not be far off when moving pictures will be projected with the new light.

The actinic value of acetylene very early commended it to the use of photographers, who as they come to fully understand and appreciate how useful it really is will follow their more progressive brethren and adopt it. There is no light so good for enlargements and some classes of commercial work, still its application in this direction has scarcely commenced.

Owing to its accuracy the acetylene light lends itself readily to examinations by physicians, surgeons, dentists and other professional men. Whatever lights may be in common use, the future will find every complete operating room equipped with acetylene. It will be found especially desirable in hospitals where emergency work is certain to demand instant attention, sometimes at hours most inopportune. If an acetylene generator is used, the wires will never be down nor a fuse burned out, the engineer will not be off nor the mantles or glassware broken, but the little lighting plant entire may be placed completely under the control of those in the operating room, ready for immediate service.

In horticulture and similar pursuits acetylene light will be utilized experimentally and commercially in forcing.

For Railroad Lighting.—Railroad men who are up to date in their desire to reduce the hazards of operation to a minimum stand ready to give the engineers on night runs every appliance which will tend to do away with collisions and other mishaps. Not the least of these is a good light, and acetylene in a proper device is demonstrated to be the very best illuminant in a headlight. Its steadiness, cheapness, simplicity, reliability, durability and great power, free from all the drawbacks that attend the use of other intense lights, will crowd it rapidly to the front and make acetylene the only acceptable headlight for modern railway operation. Familiarity with acetylene on engines in the operating and mechanical departments of our great railway systems will make its adoption in coaches a matter of course. Eight or ten burners, each consuming a maximum of ¾-foot of gas per hour, are represented to light a car satisfactorily for many roads. As used in most of the all-night service, these jets represent a consumption of about 60 feet of acetylene, which cannot cost more than 60 cents under the most unfavorable circumstances, or 42 cents under the best. One hundred and eighty feet of Pintsch gas required for the same service, at $5 per 1,000, costs 90 cents, which in the case of companies operating their own gas works is reduced to 70 cents. To the saving shown by simple mathematical computation must be added the enormous advantages which attend the fact that it is

practical to apply acetylene apparatus to coaches in such form that recharging may be done anywhere, at any time, by such employees as may be present. No prophet is required to foretell the great progress acetylene must make on transportation lines.

Developments of the bicycle lamp for automobiles, carriages and lanterns bid fair to meet the demands of an exacting public which has been compelled to admit the efficiency of such devices while recognizing their limitations.

Single lights will continue to be a fine introduction of acetylene to many households, but until some cheap and effective system of refrigeration is developed and applied to table lamps their necessary bulk will keep them in a class which is designated as "portable" largely through courtesy or the license of the advertiser.

Generator Development.—While generator development has been very rapid during the past five years, a little sober thought shows that most of the changes have been made in the direction of greater simplicity, which usually has resulted in better performance. Still more will simplicity mark the acceptable makes of generator which the market will demand in the future. Manufacturers who fail to meet this public demand will pay dearly for their folly.

Much has been written regarding types of generators which is justly regarded as empirical. The arbitrary dictum that one or another class or type of generators is condemned and unfitted for all purposes will be modified by the real expert who has added to careful experiment and scientific tabulation a well assimilated and classified mass of information derived from actual experience and study in the lighting field.

Acetylenists of the better class already know, and in the future all will admit, that each installation is a problem by itself, to be carefully considered and decided right if all conditions are to be completely met and the customer of to-day made the friend and reference of to-morrow or next year.

The Different Types.—No generator, and no type of generator, is "the best" for every installation. The size, requirements, occupancy and location must be considered. Nature of demand, class of attendance and climate even have a bearing upon performance—either low first cost, lightness, durability, compactness or economy of maintenance may be the one important feature to which all other considerations must bow, and in some cases an unstable foundation may compel the abandonment of all preconceived ideas. There are special applications that permit the sacrifice of everything else to secure automatic operation with an interval of six months between the times of recharging. There are other places where no carbide feeding mechanism will be so good as an industrious laborer with a well hung shovel. Between the two extremes indicated there are occasions which will demand great variations in design to accommodate the generator to the needs of the buyer.

The "recession" type is ideal for many purposes; the "dump" or "carbide feed" seems to be imperative sometimes; for certain classes of service, the "overflow" generator appears to meet every requirement; and there are abnormal conditions which make the condemned "drip" type the only available apparatus. Either one put in the wrong place will bring disappointment to the buyer and seller alike.

How may these places be distinguished or classified? That information will be part of the capital of the intelligent and diligent student of acetylene who one day will class as an engineer.

Burners.—Burners must be selected under many of the rules that apply to the choice of generators. There are times when durability may be properly sacrificed to secure maximum efficiency, but it will more often be found desirable to have burners durable at all hazards with the greatest efficiency that appears possible under the circumstances. Price, while a secondary consideration, should show a downward tendency as production increases and facilities are improved.

The purification in the ordinary small outfit has been the basis of much humbug in the acetylene business. The bubbling of gas through water will never remove the products of polymerization, nor the small particles of impurities held in mechanical suspension. The mechanical scrubber will be adopted as a part of every permanent installation, and in extreme cases, where proper attendance is at hand, some chemical purifiers will be placed, though the general use of such appliances seems remote at this time.

The application of carbide, acetylene and residuum to uses outside the lighting field are not properly part of this presentation, but in passing it is proper to note that they will have a wider application in agriculture, therapy, pharmacy and applied chemistry. The pure chemistry of acetylene seems to be well settled, but there are several directions which experimental science may take that promise results. Inasmuch as the use of acetylene and air mixtures through pipes is impracticable, there is a field for a satisfactory cheap gas to serve as a diluent for acetylene, which shall be harmless and practically of the same density, so stratification may be reduced to the minimum.

In the production of carbide the discovery of a proper flux and the maximum utilization of waste in by-products or in the preparation of materials offer inviting openings for investigators.

In view of the great variety of electric furnaces already developed radical departures seem improbable, but no one can gainsay the fact that every advance in electrical development means a corresponding forward stride in the production of carbide, with benefit to the acetylene industry.

The Operating Cost.—The price of carbide to the consumer will always be a prime factor in the extension of the acetylene business, so that carbide processes are worth consideration. Experiments on a large scale have demonstrated that carbide of excellent quality can be made from many carbon bases, so it is possible that some materials less burdened with impurities than the coke now used will make easy the production of carbide more uniform in quality than any commercially known at this time.

The reduction in price made during the past year encourages the belief that the growth of the industry will bring about still further declines below the fairly reasonable prices ruling in most parts of the United States. Uniformity in the system of distribution must be brought about, and is coming slowly, but some radical departures from existing methods of transportation and packing should be made if the acetylene consumer is to be relieved of all the dead weight possible under the circumstances. Some way should be devised to inaugurate the use of a uniform returnable package containing about 200 pounds. While the drums used are excellent for the purpose, a little reflection raises the question what they cost and what they are good for when empty. As they cost about 10 per cent. of the gross selling price and are practically worthless to most consumers of carbide, it is plain that their rational elimination means economy for the user of acetylene. Most things in this world work out about right, and so the 100-pound can may properly be considered a temporary expedient.

The Patent Office has been so hard worked by inventors and alleged inventors of acetylene appliances that it looks to a conservative observer as if the end were about reached. The future may see some radical departures in the direction of burners, but developments in other lines seem likely to be limited to minor improvements. Before the real ownership of some devices now quite generally used is settled there are indications that there will be some bitterly fought patent law suits, but common sense appears to dictate a policy in this connection which shall limit all annoyance and expense to the trade. The Electro Gas Company, claiming all the basic carbide and acetylene rights, owe it to their stockholders to protect the public against unwarranted attempts of adventurers and speculators to reap where others have sown.

Insurance.—Insurance permission under existing conditions is a precedent to the successful conduct of the acetylene business. From a position of prohibition in 1896 the underwriters have moved forward to the point of indorsing permits for the installation and use inside buildings of such apparatus as has passed the inspection of their engineers, and without additional premium.

During the past few months there has been some discussion of the question whether "approved" and "permitted" are equivalent terms. The distinction appears to be that appliances for extinguishing fires and reducing fire hazards may be "approved," while hazards themselves may be "permitted." If this is accepted as a proper version of the matter, it is certain that the record of acetylene generators in actual use will entitle them to be advanced from the class of "permitted" to that of "approved" devices, and it does not seem a far cry, if facts count for more than theories, to the time when the standard fire policy now carrying permission to use kerosene and store 5 barrels on the premises will grant the occupant the right to use acetylene or ignore the matter entirely. It does not seem unreasonable to expect that in many cases where other lighting systems are displaced, reductions in premium rate will accompany the installation of acetylene. Such action is justifiable, and will prove profitable for the underwriters who take the advanced position.

Selling.—Marketing is the great acetylene problem. Scientifically, experimentally, technically, mechanically, acetylene has reached a stature worthy of every consideration. Commercially it is still in swaddling clothes. Vast sums have been spent in exploiting it, years of active life have been devoted to it, but to the great mass of the people it is but a beautiful chimera. In spots, where conservatism and egotism have not gone to seed, the friends of acetylene have succeeded in proving their right to live and thrive; their patrons rise up to call them blessed, and carping critics have been forced to cease their unwarranted attacks. The good record will continue to be made, but the advance will be in

geometrical instead of arithmetical progression; now it is a question of multiplication, not slow moving addition.

The satisfaction derived by a user of acetylene from his apparatus is very closely related to the expertness of the man who attended to his installation. This being the case, it is natural that much of the best work has been and will be done by traveling representatives of manufacturers. However, such methods are unduly expensive, and it behooves the continuously successful builder of generators to secure and retain local representatives who will qualify themselves to handle the business. Specialists are best, but circumstances limit their usefulness for some time to a relatively small number of points. The established dealer who is qualified to install generators and pipe buildings for many years must be the outlet for the manufacturer. Plumbers, fitters, tinners and machinists, with a fair mechanical equipment and a reasonable amount of energy, will discover in acetylene a source of profit and reputation if they choose reliable generators from established responsible manufacturers who will properly guarantee their goods. In the face of such competition the fakir must go back to the gold brick business and the experimental tinker cannot secure a hearing.

The Outlook.– The future checks upon the introduction of acetylene, like those of the past, will be ignorance, doubt and fear. Many men of letters and men of affairs are densely ignorant about some things – acetylene is one of those things.

There is a peculiar quality of human nature that will cause men to face bravely any danger which is seen, while seeking every means to avoid the possible terrors of the unknown, which sometimes develops genuine fright before the innocent cause of all the imaginary trouble appears in plain view. There is nothing quite so sure to strike terror to the mind of a child as the sigh of a vibrating chimney hole cover on a blustering, windy night, but the dread is gone when the cause is located and explained. In the same way will the prejudice now existing in some quarters be dissipated when a little accurate information is allowed to climb over the high wall of self satisfaction with which these ultra conservatives have surrounded themselves.

If a man is intelligent he needs nothing but education to make him a radical on the side of acetylene – and more radicals are made each month as the scope of the acetylene industry extends.

Education.—Education will proceed through many channels. In the past the advertising matter of the interested promoter has been largely discounted by a discerning public, and that habit of thought will make the future force of such publications doubly difficult to secure, but it is daily receiving reinforcement in the writings prepared by professors and students in schools, colleges and universities, as will continue to be the case, for the "witchery of acetylene" once experienced is never entirely overcome. Trade schools and technical institutions are making brief courses in acetylene part of the curriculum, and it is becoming a more prominent subject of discussion at the meetings of trade associations and learned societies. The information thus acquired will be retailed more and more as time goes on, until the first thought of one needing light will be acetylene.

Better, though, than all these centers of advanced thought is the quiet demonstration of a satisfactory acetylene generator in actual use. Tome of scientist, essay of scholar, elaboration of editor, screed of advertiser, persuasion of salesman, not one will equal in educational value the quiet testimony of friends already heard in the land: "Certainly, acetylene is all right; have used it for years."

The general use of acetylene will develop through the natural steps of performance, education, knowledge, wisdom, happiness. Opposition serves only to give it more prominence. "Truth is mighty and will prevail."

President Morton's Gift to the Stevens Institute of Technology.

On the occasion of the 29th Commencement of the Stevens Institute of Technology (held in the Lyric Theater, Hoboken, N. J., June 17th) forty graduates received the parchment which entitles them to add "M.E." to their signatures. In the absence of Mr. Dod (who is touring in Europe) Mr. A. C. Humphreys of the firm of Humphreys & Glasgow, was deputed by the Trustees to act as Chairman. The address by Mr. Humphreys, which is appended, shows how much of a practical believer in the Institute, over which he has so ably presided for years, its respected President is. Chairman Humphreys said:

I have a few announcements to make, one of them quite outside of the ordinary routine. The Wm. A. Macy prize has been awarded to Mr. Herman Koester, of the freshmen class. This prize is awarded to that student entering the college from the public schools of Hoboken, who has the best standing at the end of the freshmen year.

At last year's commencement President Morton announced that ground had just been broken for a new building to be known as the Carnegie Laboratory of Engineering. The title at once indicates to whose generosity we are indebted for this much needed and practical addition to our plant. This building is now completed, and by October will be equipped with the necessary machinery and apparatus, and so be ready for work during the coming college year. The erection of this building made necessary the installation of a new boiler plant. This has been provided through another donation from President Morton.

In the near future steps will probably be taken looking to the erection of another new building, to be devoted to the department of chemistry. The funds for this have been subscribed by President Morton and the alumni. Although for a year past the funds in hand have been about sufficient for the erection of this building, the Trustees have felt that it was not wise to undertake this further responsibility until they saw that the maintenance of these two additional buildings would not be a burden upon the Institute's already fully taxed treasury.

But through the continued generosity of President Morton, the maintenance of the chemical building is assured, and the Trustees now feel that they may, with a reasonable degree of safety, shortly proceed with its erection.

Perhaps I cannot give the facts in connection with this last donation better than by reading a resolution passed at a meeting of the Board of Trustees held a few days since:

Whereas, President Henry Morton has donated to Stevens Institute of Technology $50,000 in bonds, to be united with his previous donation of $30,000 for the chair of engineering now superseded, in order to create an endowment fund for the maintenance of the chemical building soon to be erected from funds subscribed by himself and the alumni; or in case of other provision being made for the maintenance of this building, the income of the fund to be applied as need may arise for pensioning such retiring members of the faculty of Stevens Institute as may, by reason of age or sickness, become incapacitated while in the employment of said Institute;

Resolved, That the Trustees accept this additional donation in accordance with the terms set out in President Morton's letter of June 6, 1901, which is made part of the record of this meeting.

Resolved, That the combined fund be known as the Henry Morton Endowment Fund.

Resolved, That the Trustees hereby express to President Morton their keen appreciation of his continued generosity to the Institute, the repeated expressions of which aggregate a sum of no less than $145,000, whereby the Institute has been enabled to opportunely broaden its field of usefulness and meet developed requirements for which its original endowment proved inadequate; and further

Resolved, That the Trustees avail themselves of this opportunity to record their recognition of the foresight and wise initiative exercised by President Morton in shaping the original character of the Institute and their grateful sense of his able and devoted administration of its affairs to which, more than to any other source, the Trustees attribute its success.

We may well admire the philanthropy which finds expression in such generous deeds, even though the donor may give from such an abundance as to leave millions yet untouched. Certainly, then, there is complete warrant for our admiration and respect where, as in this case, the gifts are taken from the simple competency of a professional man, gained by a life of most intelligent, but still exacting, daily toil.

Dr. Morton, like Mr. Carnegie, has chosen to be his own executor. To my personal knowledge, Dr. Morton's generosity has entailed distinct self-denial on his part.

I may say further, without breach of confidence, that Colonel E. A. Stevens was the author of the concluding words of the resolution just read, giving the first credit for the success of the Institute to President Morton.

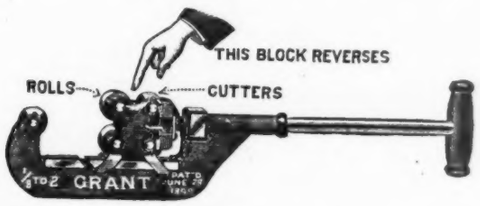
To guard against misunderstanding, it may be well to say another word in regard to our endowment. The original endowment bequeathed by Mr. E. A. Stevens was thought at the time to be all sufficient for the scheme in mind. Although the will dates back only to 1867, none of those concerned had any true conception of the work for which Stevens Institute was so shortly to become responsible. With the broadening of our field the demands upon our treasury naturally have increased, so that now we are obliged to look for assistance outside of the original Stevens' endowment, generous as it was.

The Trustees in the past have only been able to meet these demands

through timely additions to our endowment, of which President Morton has subscribed more than one-half. Up to the present our work has not suffered, but we can plainly see that there are additional demands to be met in the not distant future, and we must hope that Dr. Morton's striking example will move others to offer the necessary additional support. The alumni have indicated their willingness to subscribe to the Institute's needs, but it is to be remembered that the profession of mechanical engineering but seldom leads to wealth on the part of the practitioner, and we must, therefore, hope that those who have indirectly profited by the work of Stevens men will feel called to assist in our work, which has had no small part in the practical development of the industrial resources of the United States, of which so much is now heard at home and abroad.

The Grant Quick-Change Pipe Cutter.

Mr. Homer F. Livermore, 81 Pearl street, Boston, Mass., is placing before plumbers and steam fitters a device known as the Grant Quick-Change Pipe Cutter, which appears to possess many commendable features. The illustration plainly sets forth the construction of the tool,



a feature of which is a reversible block used in connection with the adjusting lever. On two corners of this block are rolls, and on the other two corners are disk cutters. This block can be readily reversed so as to bring all three cutters into play in cutting large pipe. The rolls will press small pipe against the single cutter when the smaller sizes of pipe are being handled. The cutter is adapted for cutting all sizes of pipe from ⅛ inch to 2 inches, so that only one pipe cutter is necessary in a kit of tools to equip the workman for all ordinary work. It is also claimed that the tool is made of the best materials and is strong, light and simple, so that it is likely to be durable. The parts are all made interchangeable so that in case of accident any part may be renewed.

The Burning of Oil in Tanks.

The *Journal of Gas Lighting* says that a good deal of interest was naturally taken by large users of heavy mineral oils in the United Kingdom, in the disastrous petroleum fire which occurred at Baku in the beginning of February. On this occasion, 7 million "poods" of oil were destroyed; and there was a great loss of house and other property. The peculiar interest of this conflagration, however, proceeded from the serious questions it suggested respecting the conditions of the safe storage of heavy oils. It appeared to bring to the front, in the most dramatic way, the hackneyed topic of the relation between the flash point of mineral oil and its liability to take and spread fire. For some inscrutable reason, the absolute security of high flash point oil has been made a sort of dogma by a certain sect of politicians in this country. Only raise the flast point high enough, according to this assumption—say, to 105° F.—and there will be no more lamp accidents or petroleum fires. The London County Council have asked the Government to take this step, being happily debarred from bringing in a bill themselves for the purpose; and they absolutely decline to pay any heed to the objections that petroleum legislation on these lines would have the twofold effect of considerably raising the price of oil to the public, and encouraging a false idea of the conditions under which such oil can be safely stored and handled.

It is scarcely necessary to repeat that the best expert opinion does not support this infatuation for a high flash point, holding rather that the elements of safety in this connection cannot be reduced to this one requirement. Apparently tending to justify this opinion came the great Baku fire, which was an affair of petroleum residues, usually regarded as almost as "dead as ditch water." We are indebted to the *Petroleum Review* for a valuable report of what has been done on the spot by way of investigating the origin and nature of the outbreak. A Committee of the Russian Imperial Technical Society was appointed to investigate the matter, and put the facts upon record. It was in this way established that the fire first broke out at the southern end of an open residuals bay belonging to the Caspian and Black Sea Company. It contained at the time 4¾ million poods of residuals. The surface area of the bay was 32,900 square feet; and when it was first seen to be in flames, only 280 feet of it were alight. This area rapidly spread. The Committee concluded that the fire could only have been caused by the addition of benzine or refined oil, purposely ignited. So far, there was no mystery about the conflagration. After the residuals had been blazing away for 24 hours, and the depth of liquid had fallen from 25 feet to 14 or 15 feet, there came a great overflow of the burning fluid; and in one place a large volume of steam and flame spurted up to the height of 70 feet, and scattered fire all around. In less than 5 minutes the whole surrounding district was well alight. This was what did most of the mischief and caused the greatest uneasiness; the mere burning away of an open tank of residuals counting for little or nothing in comparison.

A Special Sub-Committee of three local petroleum chemists and experts was therefore entrusted with the duty of making independent experiments aimed at the verification of the more plausible hypotheses framed to account for the overflow and geyserlike upheaval. The first hypothesis connected these phenomena with the presence of water, which was a recognized and natural fact in the circumstances. There is always a proportion of water in these refuse oils, which lies at the bottom of the bays. The average specific gravity of the mass of residues is 0.908, at atmospheric temperature. Supposing this mass to be ignited, a distilling action goes on, by which, in the first place, the lighter hydrocarbons are separated and burn, leaving what remains constantly getting heavier, as well as hotter. The heaviest grades consequently sink lower and lower, until they touch the layer of water. This eventually boils, forming steam, which is kept down by the superincumbent heavy and viscous mass of oils, until it attains a pressure sufficient to blow through this mass. Then what happens is governed by the character of the oils. If they are very heavy and viscous, the steam will cause a frothy overflow; which will come over the edge of the tank in a large mass. If, and where the oil is of low viscosity, it will "blow" in the form of spray.

The foregoing seems rational. One experimenter sought to reproduce the conditions with solar distillate in glass vessels above a layer of water. When set on fire at the top, the formation of distillation products was distinctly seen, and the heavy residue fell to the bottom, with the result that steam was formed. Although the account is not so clear as might be desired, it seems that the hypothetical expectation was confirmed; the water being convicted of supplying the explosive force. In the absence of water, the oil burns harmlessly away. Another noteworthy observation was made, that where there is a good deal of bottom water, sufficient to absorb the heat slowly and not generate steam, there is no overflow or explosion. It is a small quantity of water that is mischievous. Therefore, in order to insure the harmless burning away of an ignited oil tank, the best thing to do is to add water, not on the top but poured in at the bottom. It is known that the transmission of heat downwards through water is a slow operation.

In practice, however, these heavy oil residuals, like carburetted water gas tar, frequently contain a considerable quantity of water entrained with them so as almost to constitute an emulsion; and one set of experiments was designed to test the effect of this condition in the event of fire. The mixture burnt with loud cracking noises, and usually ended by overflowing. On the whole, and after reviewing all the facts of observation and the experimental evidence, the Committee arrived at the conclusion that the cause of the overflow and eruption of the burning oil was to be found in the water present, partly entrained, and partly separated out at the bottom of the bay. No water was pumped into the bay during the fire. It was ascertained that at the beginning of the fire the condition of the contents of the bay was as follows: There was, towards the bottom, 15 feet of tarry material containing some water in suspension, while water had also separated out, and lay at the bottom. Above this tar floated 10 feet of light residuals, not containing any water worth speaking of. It was this water free liquid that burnt harmlessly for 24 hours; and only when the fire reached the heavy and watery stuff beneath it, did eruption and overflowing take place.

Several reflections are suggested by this narrative, one of which is concerned with the question of the entrained and separated water which always exists in oil and tar tanks. It seems to be indicated that there should always be some water—the amount is put by one investigator at 4 per cent.—at the bottom of the tank. If there are means of pumping more cold water into this part of a tank, and extracting the warm water, the chances of a dangerous fire would be so far diminished. To throw water on the top of a blazing tank would be an act of madness. It is quite different, however, with steam. There should be little difficulty

in smothering the flames of any ordinary oil or tar tank with live steam, simply turned in upon the surface without particular direction. It seems tolerably clear that when once a mass of oil is alight, the question of its flash point ceases to possess any practical importance. The effect of mass in these cases is almost incalculable.

Evidently, it will never be safe for a gas manager to think that a store of solar distillate or any other heavy oil will not burn. It is suggested that where suspended water forms a higher proportion than 5 per cent. of the weight of the oil, the latter will not take fire. Perhaps not, if the mixture is uniform and the igniting flame or spark applied to it in this condition. The risk is increased, however, by the circumstance that such emulsions are never uniform; but are invariably richer in combustibles at the top. Here a film of volatile hydrocarbons is usually to be found; and it is quite possible that the outbreak at Baku may have had no more recondite origin than a lighted match casually dropped from somebody's "eternal cigarette" into this particular layer of inflammable oil.

Arsenic in Coal and Coke.

[By Mr. R. F. Wood Smith and Mr. R. L. Jenks in the English *Journal of the Society of Chemical Industry*.]

Since the presence of arsenic in beers brewed only from malt and hops, and also from the malt itself, has been proved beyond a doubt, the question of how far the fuels used in malting are capable of introducing this impurity has assumed importance. A conceivable method of determining the total arsenic present in the fuel is to deflagrate a sample in the manner employed for the estimation of sulphur, and to submit the residue, after it has been suitably reduced, to quantitative examination by the Marsh-Berzelius-Hehner method. Experiment makes it clear, however, that such a method gives results that are of little use to the maltster, whose only concern is as to the amount of arsenic that will find its way into the malt during the drying processes. This amount undoubtedly differs from the total asenic present in the raw fuel, part of this being "volatile" and very dangerous, whilst the other part remains "fixed" in the fuel ashes, and is therefore far less dangerous.

For these reasons it appears desirable to lay before this Society a method of analysis which imitates as closely as possible the conditions that obtain in the malt kiln itself, and which makes it possible, without the use of any chemical reagent other than dilute sulphuric acid known to be arsenic free—a point itself of particular importance—to state with considerable confidence whether or not a given coal or coke may be safely employed as a malting fuel.

Method of Analysis.—Briefly, the method is as follows: A piece of hard combustion tubing about 20 inches long is selected, one end of which is left open; about 4 inches from the other end the tube is drawn before the blowpipe flame into a constriction about 2 mm. in diameter. The next inch is left to form a bulb or reservoir, and the last 3 inches are drawn into a long tapered nose piece of convenient bore (say 2 to 3 mm.) and bent at right angles so that it can be passed through the rubber stopper of a wash bottle of any desirable shape or size. This wash bottle is partly filled with dilute sulphuric acid arsenic free, and air can then be aspirated through the whole apparatus by means of a short elbow piece passing out from the stopper and connected to the suction pump. If more convenient, air may be forced through the tube by positive pressure at the other end, but in either case volatile products are to be condensed in the bulb or the acid contained in the wash bottle. The use of oxygen or any special oxidizer to assist combustion does not appear desirable, as being too great a departure from normal conditions. 5 to 15 grammes of the sampled fuel are broken into fragments of about the size of a pea, placed in the combustion tube near the free end and heated on an ordinary combustion furnace, when the pump has been started and is working smoothly.

The current of air should be fairly rapid in order to insure as complete combustion as possible. The layer of fuel should be from 6 to 8 inches in length, loosely, but continuously, packed, and consisting of the small fragments described above. The conditions of a kiln fire are thus fairly closely reproduced; and experiments show that the rigid sampling and minute pulverizing usually observed in minaral analyses are unnecessary and disadvantageous for the purpose in question.

The whole tube is now cautiously heated to remove moisture, and the fuel then strongly ignited inch by inch, proceeding from the end at which the air enters the tube. If the further end is judiciously heated, all condensation takes place in the bulb beyond the constriction, or in the acid of the wash bottle. Care must be taken that the arsenical vapors are not allowed to pass over any length of calcined material, in which case the results obtained are significantly lower than when this treatment is avoided; as, however, the fuel glows brightly in the region of combustion, it is not difficult to adjust the speed of ignition so as to obtain the required conditions. The heating usually lasts for some three hours, the ash being then left, for the most part, as a nearly colorless or ruddy powder. It is probable that all the volatile arsenic is obtained in a much shorter time, but the ash is difficult to treat unless thoroughly burned. The operation requires little attention if the pump can be relied upon to work automatically.

Wheu the tube is cold the ashes are carefully withdrawn and laid aside for determination of "fixed" arsenic, whilst the contents of the bulb are washed into the bottle with dilute acid by means of a pipette long enough to reach down to the constriction. In this way only deposits beyond the constriction are removed, any dust on the walls of the main part of the tube being left to be washed into the ashes. A simpler method is to sever the tube at the constriction, proceeding at once to examine the volatilized products and leaving the rest of the tube to cool in the furnace. The contents of the wash bottle are made to a definite bulk, and an aliquot part added to the Marsh apparatus, the results calculated on the amount of fuel used being returned as "volatile arsenic."

The ashes are then tritutrated in a clean mortar, washed with dilute sulpuric acid into a small flask, gently warmed for a few minutes, and then allowed to stand for at least twelve hours. In this way any arsenic compounds present are reduced practically completely to the arsenious condition by the hydrogen sulphide, which is always observed to be evolved in appreciable quantity. The liquid is then diluted to a suitable bulk and an aliquot part, previously warmed on the water bath to remove excess of hydrogen sulphate, passed into the Marsh apparatus. This result is returned as "fixed arsenic."

Results —Three fuels used for malting purposes gave the following results when examined as described above:

	Volatile Arsenic. Grains per lb. of Fuel.	Fixed Arsenic. Grains per lb. of Fuel.
(*a*) Anthracite	$2\frac{1}{50}$	$\frac{1}{35}$
(*b*) Coke Breeze	$\frac{1}{50}$	$\frac{1}{2}$
(*c*) Gas Coke	$\frac{1}{45}$	$\frac{1}{2}$

The ashes removed from the kilns themselves, eight in number, after a mixture of anthracite (two parts) and coke (one part) had been burnt for some days gave the following amounts: No. 1, $\frac{1}{8}$ grain of arsenic per lb. of ashes; No. 2, $\frac{1}{4}$; No. 3, $\frac{1}{8}$; No. 4, $\frac{1}{5}$; No. 5, $\frac{1}{4}$; No. 6, $\frac{1}{8}$; No. 7, $\frac{1}{7}$; No. 8, $\frac{1}{4}$ grain of arsenic per lb. of ashes.

It will be seen that the actual kiln ashes contain amounts of arsenic that are in close agreement with amounts that might have been predicted from the quantities of "fixed arsenic" found in the original fuels. The amounts of arsenic found in the malts dried with the same fuels also averagely correspond with the amounts indicated by the volatile arsenic figures.

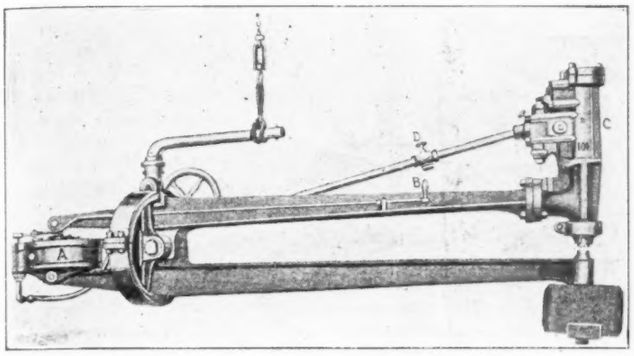
Another point in proof of the fact that the malts derive their arsenic almost solely in the volatile form is that the organic dust which settles on the beams of the drying kiln, immediately over the malt, contain, on the average, 2 grains of arsenic per pound of dust—a proportion which could never have been obtained by the mechanical admixture of ash dust which only contained $\frac{1}{4}$ grain of arsenic per pound.

It seems evident that a useful distinction can be drawn between the volatile and fixed arsenic present in malting fuels when determined in the manner described, and that comparatively little value can be attached to an estimation of the total arsenic only.

It might be added, in conclusion, that these results seem to confirm the possibility of retaining all the arsenic in fuels in the "fixed" form, as has, in fact, been suggested by Mr. Newlands some time back, who has applied for patents in this connection.

The Allen Pneumatic Riveter with Power Grip.

The illustration shows a pneumatic hammer riveter for boiler work, that is being put upon the market by the Allen Pneumatic Machine Works, of this city. The device has the novel attachment of a pneumatic cylinder for closing the jaws and clamping the work during the heading of the rivet. The construction and operation of the machine are quite obvious from the illustration. Briefly described, the machine consists of 2 levers hinged together like the blades of a pair of shears, having at one end a pressure cylinder to open and close the levers, and at the other end a pneumatic hammer riveter on one arm and a suitable die, with counter-weight, attached to the other arm. To operate the machine, the rivet boy, after inserting the hot rivet, moves the die and weight over the head of the rivet. The operator then admits air into



the pressure cylinder *A* by moving the rod *B*, thereby closing the long ends of the lever arms and pressing the hammer nozzle upon the plates over the rivet. The closing pressure is about 3,000 pounds. Air is then admitted to the hammer *C* by pressing the spring valve *D*. The hammer performs the heading operation by a succession of rapid blows—from 150 to 200 per minute. It is stated by the builders of the machine that the time required to form the head of a ¾-inch rivet is about 6 seconds, and that at steady straight work, allowing for ordinary detention and loss of time, 2 or 3 rivets can be placed and headed in 1 minute. It is also noted that the hammer valve is operated directly by pressure within the cylinder, and is so arranged that the length of the stroke regulates itself automatically to correspond with the gradual reduction of the end of the rivet, as the head is formed. The hammer is operated under an air pressure of 30 pounds to 40 pounds.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE new owners of the Rutland (Vt.) Peoples Gas Light Company, as it was presumed when they took over the property would, have decided to all intent and purpose to rebuild the plant. A new site has been selected, and Mr. A. E. Forstall is engaged in completing the plans.

THE Georgetown (Ky.) Water, Gas and Electric Company, to own and operate the water, gas, and electric lighting plants of Georgetown, has been incorporated. It is capitalized in $200,000 and its officers are: President, Mr. J. P. Jackson, Georgetown; General Manager, D. J. Hauss, Cincinnati, O. A prominent member of its direction is Mr. R. W. Wilson, Mayor of Newport, Ky.

THE Franchise Committee of the Toledo (O.) Charter Commission recently agreed that the following presentment represented the views of its members respecting the matter of franchises hereafter to be granted by the authorities of that city:

"*First.*—That no franchise shall be granted by ordinance for street railways, electric street railways, natural gas, artificial gas, electric lighting, telegraph or telephone, water works or any other franchise, until such ordinance shall have been submitted to a vote of the electors of the city at a general election.

"*Second.*—That no franchise, or a right to use the same either on, through, across, under or over any street, avenue, park or public place be granted for more than a period of 21 years.

"*Third.*—That no franchise shall be granted without a remuneration to the city.

"*Fourth.*—That no franchise of any kind shall be renewed or extended unless within 18 months of its expiration. All franchises for extensions to new streets or franchises already existing shall expire with the expiration of the existing franchise on the main system."

MR. THOMAS O. HORTON, who resigned the position of Manager of the Niagara Falls (N. Y.) Gas and Electric Light Company, has engaged in business on Staten Island, Richmond County, N. Y.

AT the special meeting of the shareholders in the New Haven (Conn.) Gas Light Company, held June 27, it was unanimously agreed to accept the amendment to its charter, passed by the last legislature, under which the Company may issue bonds to an amount not exceeding its capital stock.

MESSRS. JOSEPH RICHARDS, W. L. Jones, M. P. Schantz, W. R. Schaeffer and G. B. Jones have announced their intention of applying to the Governor of Pennsylvania for a charter for the Mahoning Gas Company, the purpose of which is to manufacture and supply gas for lighting in the borough of Lehighton and the township of Mahoning, the borough of Weissport and the township of Franklin, and the township of Lower Towamensing, Carbon county. Mr. James T. Marsteller is the Company's solicitor.

AT the special meeting of the shareholders of the Backus Gas Heating and Appliance Company, of Grand Rapids, Mich., held to determine the disposition that should be made of the concern, it was voted to turn its property of whatsoever description over to the Grand Rapids Gas Light Company.

THE following letter explains itself:

MORRISTOWN GAS LIGHT COMPANY,
MORRISTOWN, N. J., July 1st, 1901.

To the Editors AMERICAN GAS LIGHT JOURNAL: In your issue for the 24th of last month I notice you state: "The readers of the JOURNAL know well that Mr. Barret was the first gas engineer in the United States to seriously consider here the construction of a generating house on the inclined principle;" and right at this point let me say that that may be so, but I doubt if most of your readers knew such was the case. But, continuing, you say: "And that he was the first with us also to put his consideration into practice." And here is where, I would respectfully ask that you would kindly correct that no doubt unintentional misstatement. The first generating house on the inclined principle to be erected in the United States was at Station B, of the Laclede Gas Light Company, of St. Louis, Mo., at the time I was Superintendent of the named Station. The President of the Company, who authorized the work, was Mr. Emerson McMillin, the engineer who designed the house, along with the automatic coal-handling machinery, was Mr. Frederick Egner; and the 8 benches of 7's—inclined, with full depth regenerative benches—installed therein was furnished by the Laclede Firebrick Manufacturing Company (the same Company was the contractor in Mr. Barret's case), of St. Louis, Mo. The difference in the two instances was that Mr. Barret had the benefit of 10 years' later improvements in the designing of the inclined system that of course we, who were really pioneers in the business, did not have; and hence, no doubt, our failure with the inclines.—Respectfully, GEORGE H. BROWN.

THE annual meeting of the shareholders in the San Jose (Cal.) Light and Power Company has been postponed to the 20th inst.

A PLANT of the Pintsch type is to be erected at Los Angeles, Cal., for the better lighting service of the passenger coaches of the Sante Fe and Salt Lake routes.

THE people in charge of the gas supply of Covington, Ky., have put the selling rate for a fuel service at 75 cents per 1,000 cubic feet. This action of President Ernest seems to prove that he was earnest in his statements when he assumed charge of the fortunes of the Union Light, Heat and Power Company, of Covington.

THE Parker-Russell Mining and Manufacturing Company, of St. Louis, are furnishing the fireclay material for the new generating plant that is being installed in the works of the Bellingham Bay Gas Company, of Fairhaven, Wash., under the direction of Supt. Wharton.

MESSRS. W. P. COFFEY and Charles Newman, of Peoria, Ills., are said to be going on with the establishment of the plant at Charleston, Ills., which is known to corporate fame as the Consumers Gas and Fuel Company. We understand that Mr. Coffey is the active man in the concern.

THE Incandescent Gas Light Association of America has been formed. Its headquarters are to be in New York city, and prominent in its directorate are Messrs. L. E. Hartley, Hugo Lieber, Morris Reno, Joseph T. Robin and Charles Simon, of New York; and Mr. Irving H. Brown, of Plainfield, N. J. Its main object is to "foster the interests of the incandescent gas light industry." There seem to be quite a few Hebrews connected with the concern.

THE Federal Gas Company, with the seemingly sufficient capital of $300,000, has been organized in Titusville, Pa. The main men in the enterprise are: President and General Manager, John A. Connelly, Bradford, Pa.; Vice-President, John Gahen, Titusville, Pa.; Secretary and Treasurer, John Mullin, Bradford, Pa.

ARTICLES announcing the merging of the gas lighting interests of Staten Island, Richmond county, N.Y., have been filed. The New York and Richmond Gas Company is the undertaking proprietor.

AT a special meeting of the shareholders in the Montreal (Can.) Gas Company, held June 26th, with the President, Mr. Herbert S. Holt in the Chair, it was unanimously agreed to lease the Company and all its possessions, for a period of 98 years, to the Montreal Light, Heat and Power Company, the terms of such lease to be decided upon by the Directors of the Montreal Gas Company, About 2,500 shares of the total of 75,000 shares are disposed to dissent to the plan.

MR. EDWARD I. FROST, Vice-President of the Salisbury (N. C.) Gas and Electric Company, has notified the residents that during the current month the Company will put in services and make all necessary connections free of charge to and for any consumer whose purchase of a gas stove calls for the payment of $10—at manufacturer's lowest rates. The Company also sells stoves on the installment plan. The net rate at Salisbury for gas for cooking and heating is $1.49 per 1,000 cubic feet.

THE proprietors of the Cincinnati (O.) Gas and Electric Company have arranged for the reconstruction of its office building at 4th and Plum streets. The plans call for the changing over of the existing building and the adding thereto of a 6-story structure on McFarland street, directly in the rear of the old quarters. When completed the Company will have one of the finest office buildings in the State of Ohio.

THE proprietors of the Westchester Lighting Company, of Mount Vernon, N.Y., have determined to reduce the selling rate to $1.20 per 1,000 cubic feet, the concession to date from the 1st inst. This rate is independent of any rebate for prompt payment. The present price is $1.35 per 1,000 gross, with 10 cents off for payment before the 10th of the month. It is likely this schedule will interfere seriously with the plans of Mr. Wauhope Lynn and his associates, who had petitioned the authorities of New Rochelle (which is in the Westchester Lighting Company's district) for the right to there maintain a gas plant.

THE authorities of Wilmington, Del., have agreed to award to the Welsbach Street Lighting Company a contract for the public lighting of the streets of that city, in so far as the same is accomplished by means of gas. The bids, based on a term, were as follows: One year, $30 per lamp; three years, $29; five years, $27. The exact length of the term had not been agreed upon according to our latest advices, but it was thought that the 5-year term would be named. The Welsbach Company, of course, works in this matter in harmony with the Wilmington Coal Gas Company.

THE Cincinnati (O.) Gas and Electric Company is planning a system of branch offices throughout the city for the convenience of its customers.

MR. JOHN J. POWER, Superintendent of the Cumberland (Md.) Gas Light Company, has been authorized by his Directors to carry out this summer an extensive plan of betterments. The generating division of the works, and the scrubbing, condensing and purifying divisions as well, will be rebuilt on a considerably larger scale than the existing one. Two benches of 6's are to be installed, the firing of same to be accomplished under the half-depth plan, the work to be done by the Baltimore Retort and Firebrick Company. The scrubbing, condensing and purifying apparatus, and the other iron work as well, is to be furnished by the Kerr-Murray Manufacturing Company, of Fort Wayne, Ind. A station meter, to be housed in a new office building, has also been arranged for. The placing of 2 miles of street mains is another important item in the Company's advancing schedule. The correspondent to whom we are indebted for these particulars, adds: "The Company's gas stove trade is booming." Next year the proprietors propose to put the Company well along the "safe road" by the construction of a storage holder. Judging from all this Mr. Powers will not have many days "in the mountains."

MR. J. S. BROWN has resigned the position of Superintendent to the Danville (Ky.) Gas Company.

MR. THOMAS POWERS, for many years a trusted and efficient employee of the Milwaukee (Wis.) Gas Company, died at his home in that city the morning of June 24th. Deceased entered the Company's employ in the early '70's in a subordinate capacity, virtually working his way up to the Superintendency of its Third Ward plant. He was in his 50th year.

THE following is from a recent issue of the Boston (Mass.) *Herald*: "In the matter of the petition to the Board of Gas and Electric Light Commissioners in which it was set forth that the quality of gas and electric light supplied to Newton by the Newton and Watertown Gas Light Company was unsatisfactory, and that the cost of same was too great, the Board has recommended that from and after the 1st day of July, the net price charged for gas by the Newton and Watertown Company shall not exceed $1.15 per 1,000 cubic feet. No reduction is recommended in electric lighting rates. The Commissioners say in part: 'It is gratifying to note that since the hearing the management of the Company has approached the criticisms and difficulties then indicated in a proper spirit, and, in connection with the perfecting of its facilities in all the directions to which the complaints applied, has arranged to expend nearly $75,000, about equally divided between the gas and electric plants. When this work is completed, there is every reason to believe that the causes for all such complaints as were presented will be removed. The Company has also begun to operate its plant throughout the daytime, as requested at the hearing. The gross profit shown by the operating accounts in the electric department for the last fiscal year was about $11,000, but this profit is probably no more than is needed to meet a fair investment charge and that depreciation which seems to be inseparable from the carrying on of the electric lighting supply in the present state of the art. It is unnecessary for the decision of this case to determine the vexed problem of how large a differential, if any, should be allowed in the price to the municipality for its use as compared with the price to private consumers, but the Board cannot approve a policy by which the rates for municipal use are made so low as to impose upon private consumers the entire burden of the investment charge. The prices secured by the city are by agreement with the Company, and this Board has no authority to increase them, even were it thought desirable so to do. Any adjustment of such a condition seems to be left by the statute to mutual arrangement between the parties. It appears to be a fact, however, that so large a portion of the gross profit comes from commercial lighting that the return realized by the Company upon its investment for the street lighting business is at a less rate than the interest paid upon its loans. While the present conditions continue the Board cannot see its way clear to require a reduction in the electric lighting rates either for street or commercial purposes. Although there is a large difference between the net rate paid for gas by the city and by private consumers, as the sales to the former constitute only about 9 per cent of the total and the receipts about 7 per cent., this price is not of the same practical importance as the price for electricity. By far the greater part of the gross profit from the operations of the gas department for the last fiscal year of the Company was upon a price for gas 15 cents per 1,000 higher than that now in force, the present price having gone into effect very late in that year. The prices of materials have since the period named been subject to a considerable advance, while the price of residuals has declined. Notwithstanding these facts, however, a somewhat lower rate than that now charged will probably permit the maintanance of the present dividend and amply provide for depreciation or contingencies, along with the maintenance of the best service to the public. To such a reduction the consumers are justly entitled.'"

Suggestions at Pan-American Exposition.

Mr. Herbert Shearer says that esthetic features pertaining to city, town and village ornamentation have received a fitting tribute in the decoration of the Pan-American grounds. Entering at the Elmwood gate the artistic display of shrubbery, flowers and grass plots bordering the walks and driveways is one of the most pleasing views in connection with the Exposition. Universal civic improvement throughout the country will, no doubt, receive an impetus from this display that will have a far reaching and lasting effect.

Taken in connection with proper scientific sanitary safeguards the proper embellishment of city streets, squares and boulevards, not forgetting front and back yards, is one of the important problems before the citizens of every city, village and hamlet in the country.

Mr. W. Scott, assistant superintendent of floriculture, has fully appreciated this fact in his elaborate decorations at the Pan-American grounds.

A succession of flowers is provided in a systematic manner that he terms a floral calendar. It is so arranged as to designate each summer

(*Concluded on page 55.*)

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHAS. E. SANDERSON,
MANAGER.

PUBLISHED ON EACH MONDAY OF THE YEAR AT
No. 32 Pine Street, New York.

The JOURNAL is the official organ of the
NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.
AMERICAN GAS LIGHT ASSOCIATION.
WESTERN GAS ASSOCIATION.
OHIO GAS LIGHT ASSOCIATION.
PACIFIC COAST GAS ASSOCIATION.

TERMS:

SUBSCRIPTION—Three Dollars per annum, in advance. Single copies, 10 Cents.

Notification Respecting Advertising.—Orders for new advertising, or for changes in standing advertisements, to insure attention in the issue following their reception, must be in hand any time of Wednesday.

AGENTS:

New York—American News Co. 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, JULY 8, 1901.

(*Continued from page* 54.)

month by flowers that bloom during the time. To carry out this idea for the month of May he planted about 150,000 tulips, 30,000 hyacinths, 10,000 narcissus and 20,000 pansies; the bloom provided by this collection indicates the first half of the month. It is to be succeeded about the 15th with geraniums and begonias. Visitors becoming so engrossed with the wonders to be met with at the Exposition that they lose track of the time, may thus be set right.

Sixteen large beds of hardy roses will furnish a characteristic bloom for the first part of the month of June, to be succeeded with other flowers as the summer advances, thereby keeping up a continual succession throughout the entire Pan-American season.

Woven in with the general floral plan are many other kinds of plant decorations which lend themselves for a setting to this general arrangement, among which are about 100 species of herbaceous plants or hardy perennials, making a very handsome display in this particular. There is also a large bed of crimson ranby roses consisting of 800 plants. Large displays of evergreens, such as pines, spruces, cedars, etc., including many specimens not before exhibited in this country.

This section of the grounds at present presents a very beautiful and attractive appearance which will be continued by these succeeding species, thereby always presenting a fresh attraction, no matter how often the Pan-American visitor may pass this way.

Esthetic utility is in this manner emphasized and embellished by the lighter, though by no means less important attraction that makes the world turn around, thereby presenting the extremely important question of civic improvement in an entirely new light. Advanced thinkers along this line cannot pass through this section of the grounds without carrying away with them a renewed inspiration that will aid them in farther efforts towards improvements in this direction.

The Market for Gas Securities.

Dullness continued the predominating feature in the market for city gas shares since time of last writing. Sales were few and actual transfers fewer. It may have been the extremely hot weather that provoked or brought about the lethargy; in fact, it is quite certain the untoward atmospheric conditions caused everyone who could get out of the city to go therefrom, hence the absence of the "big speculators," whose presence causes many a turn. The Exchange concluded to enjoy a long holiday, the vacation to date from the afternoon of Wednesday (3d inst.) to the morning of Monday, the 8th inst. The close in Consolidated was made at 221 to 222, which was virtually a loss of a point for the week. The tendency, so far as one may judge from a surface survey of the situation, is towards lower prices, and mainly because of the inactivity existing in respect of the Company's policy towards the gas supply of Brooklyn. Mutual is quoted at 305 to 310, and Standard common nominally remains at 130 to 135. Quite a large number of shares of the latter remain in independent hands.

Brooklyn Union is featureless and unchanged. Peoples, of Chicago, showed some unsteadiness, closing at 117⅛ to 117¾. Under the circumstances one would naturally look for a gain in the latter instead of a loss, considering the state of the negotiations for the absorption of the Chicago Edison Company. Baltimore Consolidated maintains its recent advance.

Western, of Milwaukee, is in demand. All classes of gas bonds are higher.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

JULY 8.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$73,177,000	100	221	222
Central Union, Bonds, 5's.	3,000,000	1,000	109	110
Equitable Bonds, 6's	1,000,000	1,000	105	
" 1st Con. 5's	2,300,000	1,000	115	118
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	305	315
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	.
New Amsterdam Gas Co. .. Bonds, 5's	11,000,000	1,000	108¾	109¼
Northern Union, Bonds, 5's.	1,250,000	1,000	106	108
New York and East River . Bonds 1st 5's	3,500,000	1,000	111	115
' 1st Con. 5's	1,500,000	..	108	111
Richmond Co., S. I.	348,650	50	100	..
" Bonds	100,000	1,000	103	..
Standard	5,000,000	100	130	135
Preferred	5,000,000	100	150	155
Bonds, 1st Mortgage, 5's	1,500,000	1,000	115	117
Yonkers	299,650	500	130	
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	215	219
" " Bonds (5's)	15 000,000	1,000	118	11
Bay State	50,000,000	50	⅝	¾
" Income Bonds	2,000,000	1,000	.	75
Binghamton Gas Works	450,000	100	28	30
" 1st Mtg. 5's	509,000	1,000	92½	95
Boston United Gas Co.— 1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	7⅛	7¾
" " Bonds, 5's	5,250,000	1,000	73	76
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000		
Central San Francisco	2,000,000	..	106	108
Chicago Gas Co. Guaranteed Gold Bonds	7,650,000	1,000	104	104¼
Cincinnati Gas & Elec. Co.	29,500,000	100	103	103¾
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	106	107
Columbus (O.) Gas Lt. & Heating Co	1,682,750	100	60	65
Preferred	3,026,500	100	84	86
Consumers, Jersey City Bonds	500,000	1,000	102	103
Consumers, Toronto	1,700,000	50	215	216
Consolidated, Baltimore	11,000,000	100	65¼	65½
Mortgage, 6's	3,600,000	..	..	118
Chesapeake, 1st 6's.	1,000,000	..	..	..
Equitable, 1st 6's.	910,000	..	..	..
Consolidated, 1st 5's	1,490 000	..	..	112
Consolidated Gas Co. of N.J.	1,000,000	100	11	14
" Con. Mtg. 5's	380,000	1,000	81½	83
Consolidated G. & E. Co.'s., Little Falls, N.Y.	90,000	100	..	100
Bonds	75,000	..	..	106
Detroit City Gas Co	4,825,500	50		89
" Prior Lien 5's	5,603,000	1,000	99½	100
Detroit Gas Co., 5's	381,000	1,000	89	89½
" Inc. 5's	16,000	100	94	94½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Essex and Hudson Gas Co.	6,500,000	..	35	40
Fort Wayne	2,000,000	..	..	
" Bonds	2,000,000	..	54	58
Grand Rapids Gas Lt. Co. 1st Mtg. 5's	1,225,000	1,000	102	104
Hartford	750,000	25	240	250
Hudson County Gas Co., of New Jersey	10,500,000	..	25	..
" Bonds, 5's	10,500,000	..	101	103
Indianapolis	2,000,000	..	60	68
" Bonds, 6's	2 650,000	..	95	98
Jackson Gas Co	250,000	50	70	75
" 1st Mtg. 5's	290,000	1,000	101	102½
Kansas City Gas Light Co., of Missouri	5,000,000	100	..	36
Bonds, 1st 5's	3,822,000	1,000	101½	103
Laclede, St. Louis	10,000,000	100	85	85½
Preferred	2,500,000	100	99	101
Bonds	10,000,000	1,000	..	108½
Lafayette Gas Co., Ind.	1,000,000	100		60
Bonds	1,000,000	1,000	60	66
Louisville	2,570,000	50	110	120
Madison Gas & Elec. Co. " 1st Mtg. 6's	350,000	1,000	102½	108
" 6 per cent. scrip, due 1910	100,000	25	87	89
Montreal, Canada	2,000,000	100	182	184¾
Newark, N. J., Con. Gas Co	6,000,000	..	..	55
Bonds, 6's	4,600,000	..	..	103
New Haven	1,000,000	25	280	300
Nashville Gas Lt. Co.	1,000,000	50	110	..
Oakland, Cal.	2,000,000	..	46	47
" Bonds	750,000	..	..	..
Peoples G. L. & Coke Co., of Chicago	25,000,000	100	117½	117¾
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,000	1,000	..	..
2d "	2,500,000	1,000	104	
Rochester Gas & Elec. Co.	2,150,000	50	88	..
Preferred	2,150,000	50	118	..
Consolidated 5's	2,000,000	..	87½	90
San Francisco, Cal.	10,000,000	100	..	.
St. Paul Gas Light Co.	1,500,000	100	50	54
1st Mortgage 6's.	650,000	1,000	82	85
Extension, 6's	600,000	1,000	..	..
General Mortgage, 5's.	2,465,000	1,000	88	90½
St. Joseph Gas Co. " 1st Mtg. 5's	751,000	1,000	85	87
Syracuse, N. Y.	1,750,000	100	15	19
Bonds	1,612 000	1,000	91	93
Washington, D. C	2,600,000	20	295	300
First mortgage 6's	600,000	..	..	..
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OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
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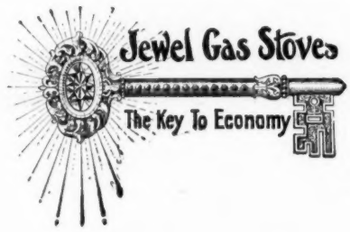

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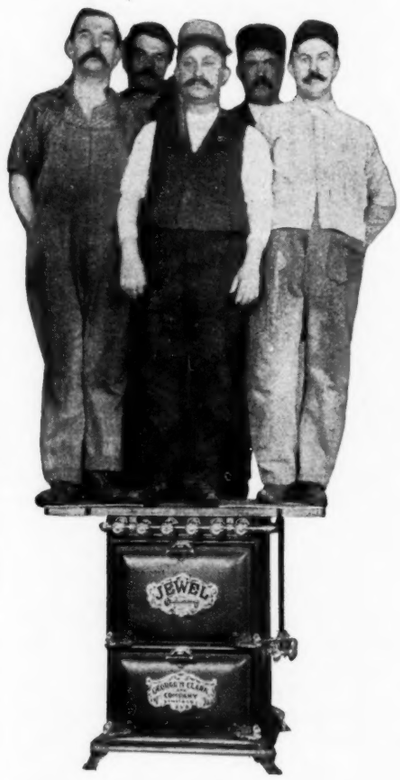

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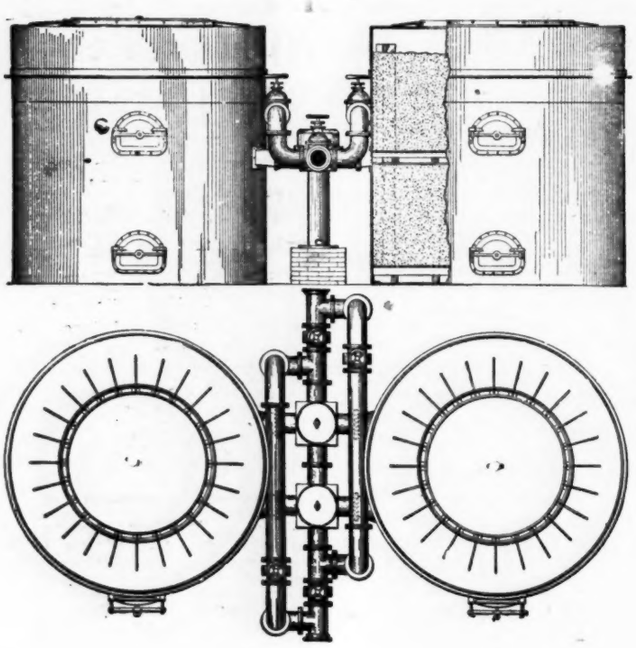

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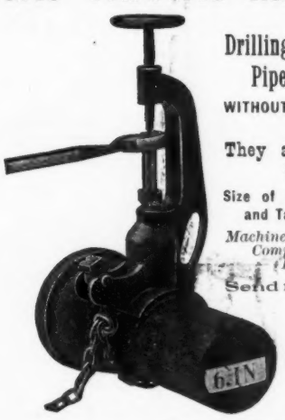

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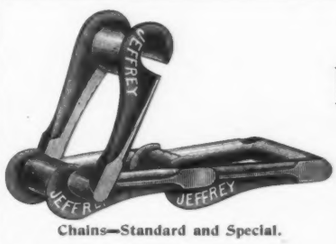

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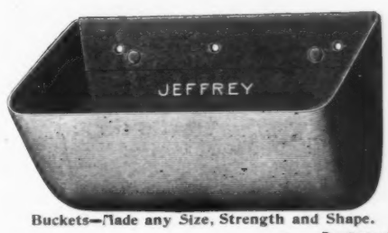

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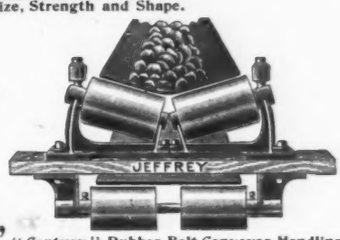

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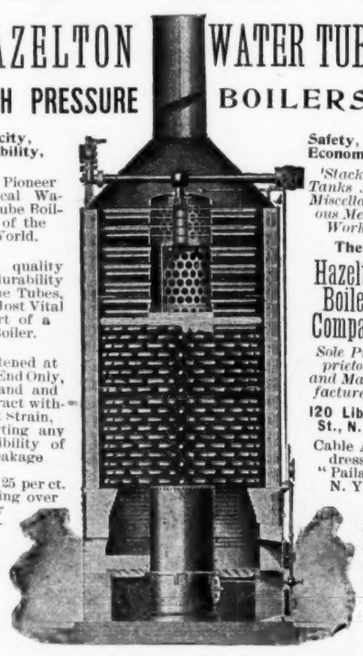

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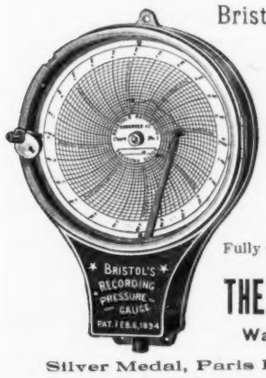

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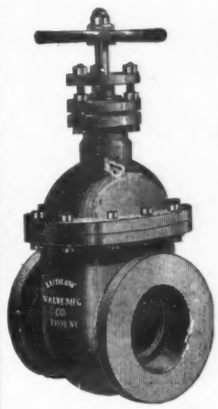

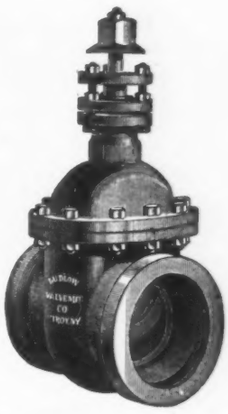

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No matter what the outcome of the sale of the above mentioned corporation may be, we wish to announce to our friends and customers that we will continue the manufacture of

STEWARD BURNERS AND E. H. LAVA TIPS.

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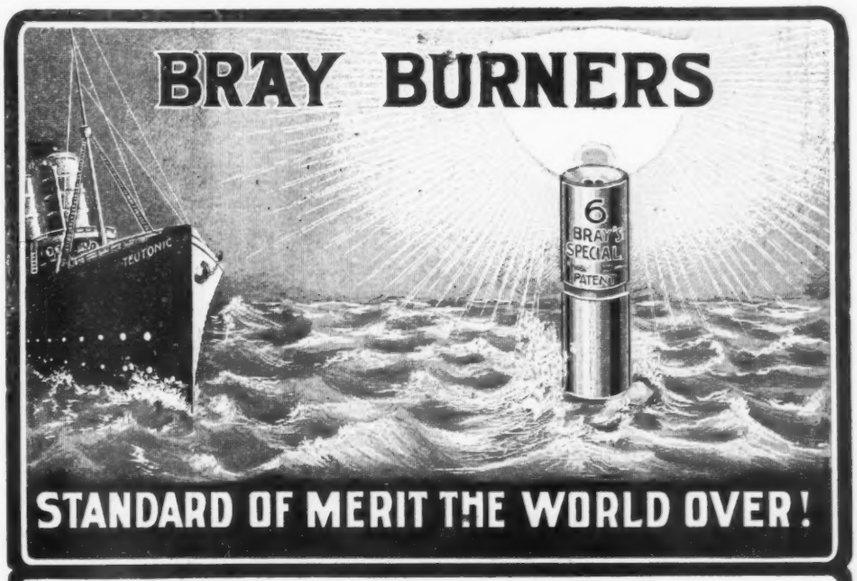
(See circular letter, American Gas Light Journal, June 24th.)



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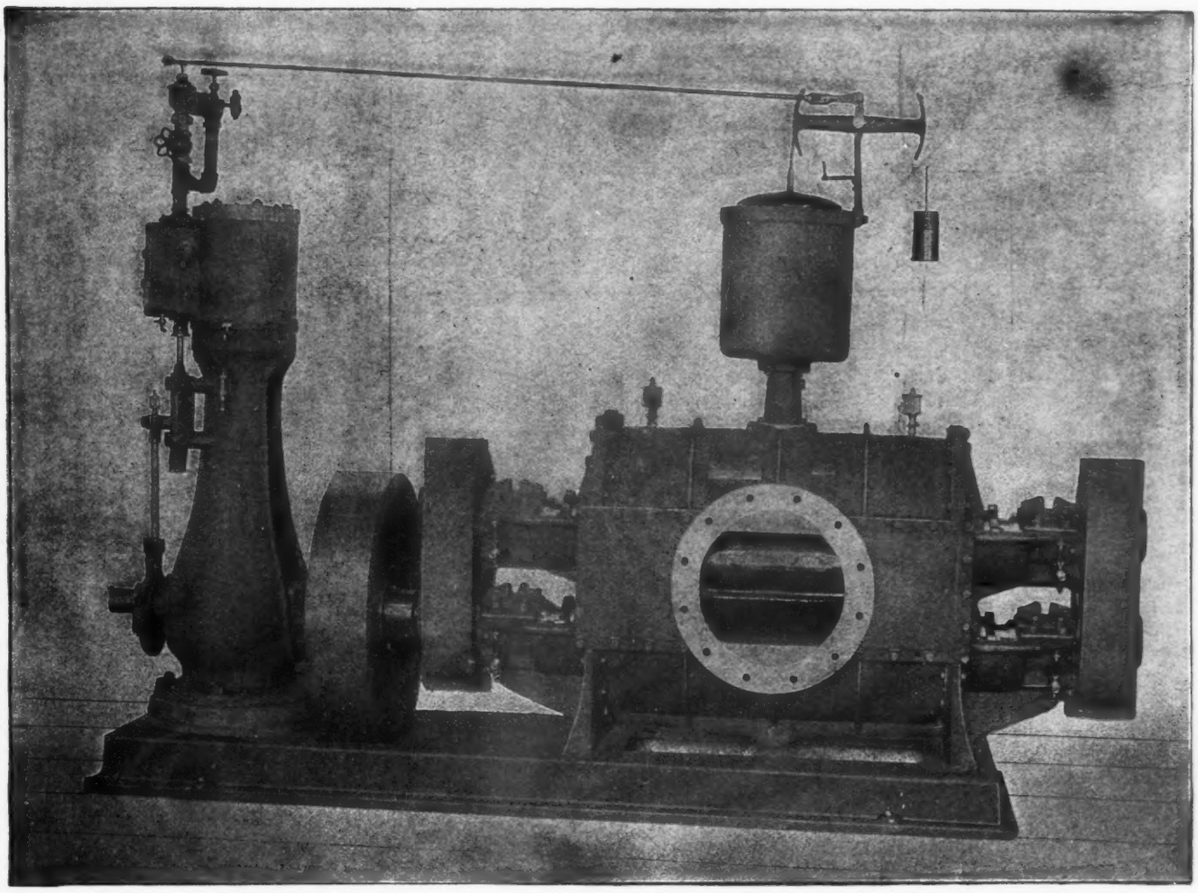

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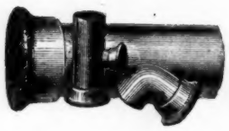

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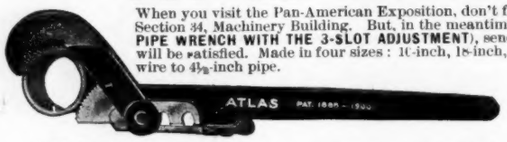

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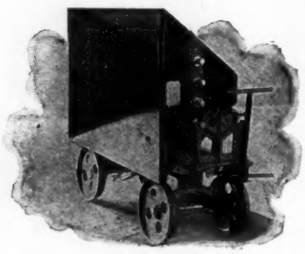

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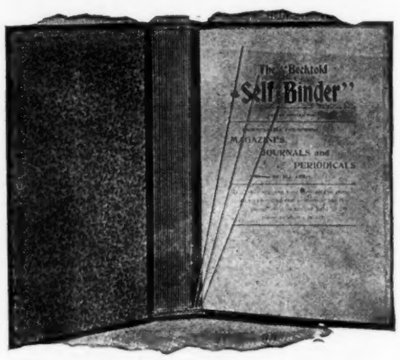

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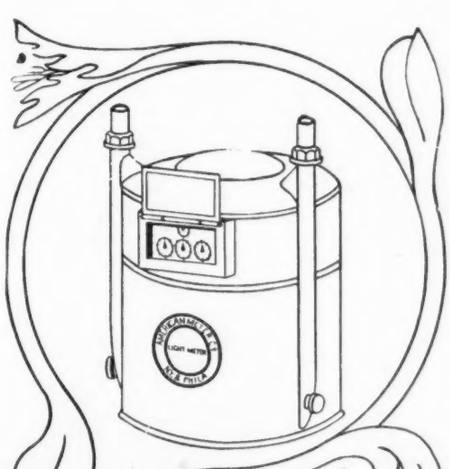

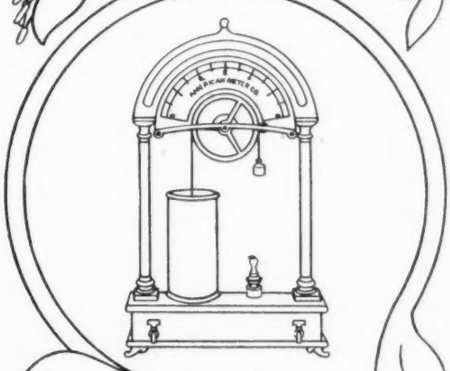

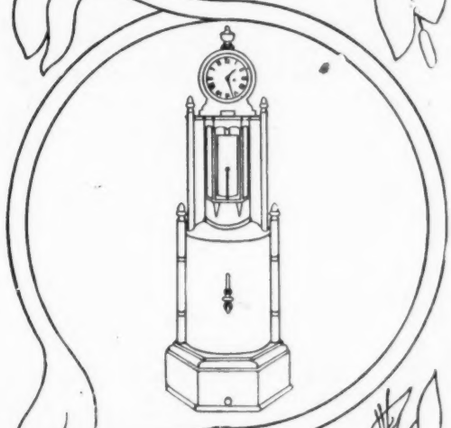

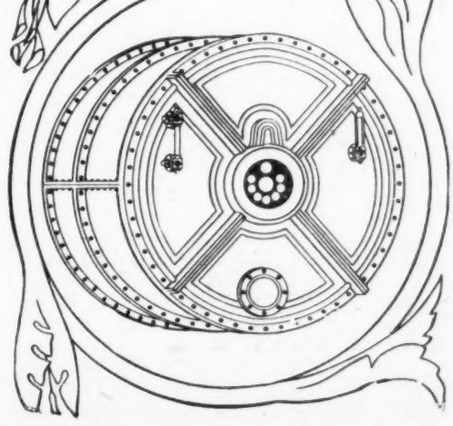

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CHICAGO, ST. LOUIS,

SAN FRANCISCO.

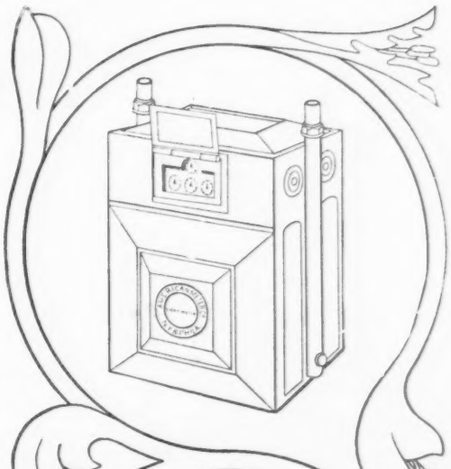
PUBLIC LIGHTING TABLE.

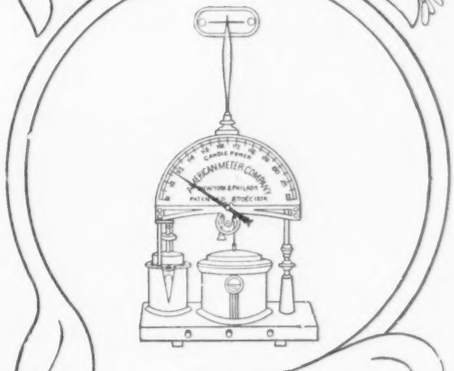
JULY, 1901.

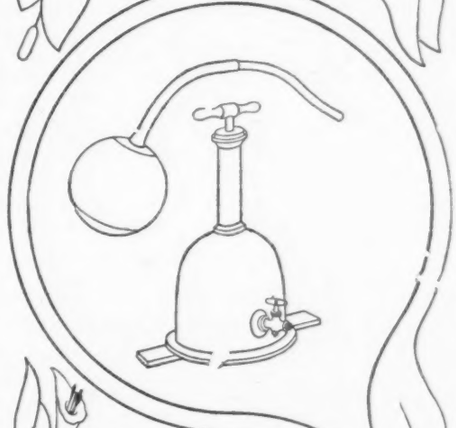
Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. Extinguish.
				P.M.	A.M
Mon.	1	No L. FM	No L.	7.30	3.15
Tue.	2	No L.	No L.	7.30	3.15
Wed.	3	8.00 PM	9.30 PM	7.30	3.15
Thu.	4	8.00	10.10	7.30	3.15
Fri.	5	8.00	10.40	7.30	3.15
Sat.	6	8.00	11.10	7.30	3.15
Sun.	7	8.00	11.50	7.30	3.15
Mon.	8	8.00 LQ	12.20 AM	7.30	3.15
Tue.	9	8.00	1.00	7.30	3.15
Wed.	10	8.00	1.40	7.30	3.15
Thu.	11	8.00	2.30	7.30	3.15
Fri.	12	8.00	3.40	7.30	3.15
Sat.	13	8.00	3.40	7.30	3.15
Sun.	14	8.00	3.40	7.30	3.15
Mon.	15	8.00 NM	3.40	7.30	3.15
Tue.	16	8.00	3.40	7.20	3.15
Wed.	17	8.00	3.40	7.20	3.15
Thu.	18	8.00	3.40	7.20	3.15
Fri.	19	8.00	3.40	7.20	3.15
Sat.	20	8.50	3.40	7.20	3.15
Sun.	21	9.20	3.50	7.20	3.15
Mon.	22	9.50	3.50	7.20	3.15
Tue.	23	10.20 FQ	3.50	7.20	3.15
Wed.	24	10.50	3.50	7.20	3.15
Thu.	25	11.40	3.50	7.20	3.15
Fri.	26	12.20 AM	3.50	7.20	3.15
Sat.	27	1.10	3.50	7.20	3.15
Sun.	28	2.10	3.50	7.20	3.15
Mon.	29	No L.	No L.	7.20	3.15
Tue.	30	No L. FM	No L.	7.10	3.30
Wed.	31	No L.	No L.	7.10	3.30

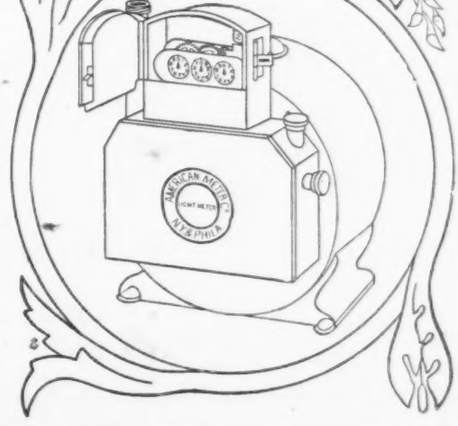
TOTAL HOURS LIGHTING DURING 1901.

By Table No. 1.	Hrs.Min.	By Table No. 2.	Hrs.Min.
January	220.10	January	423.20
February	192.30	February	355.25
March	180.00	March	355.35
April	158.30	April	298.50
May	140.40	May	264.50
June	135.40	June	234.25
July	138.00	July	243.45
August	156.20	August	280.25
September	174.40	September	321.15
October	202.30	October	374.30
November	220.40	November	401.40
December	241.30	December	433.45
Total, yr.	2161.10	Total, yr.	3987.45









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No. 36.

Controls and Operates the

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Which includes its specially DESIGNED AND PATENTED BURNER for STREET and PARK LIGHTING exclusively.

Uniformly SUCCESSFUL in seventy-five Cities and Towns.

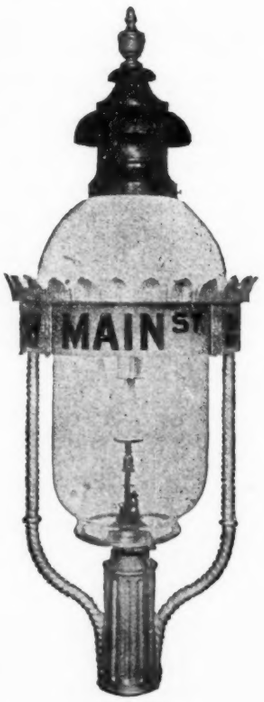
By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

POINTS OF MERIT:

It is { Economical, Attractive, Successful, Up-to-date.

IT LIGHTS THE STREET.

Where there are no gas mains we can furnish an equally good light by our SELF-GENERATING NAPHTHA WELSBACH BURNER, and thereby supply a uniform light in all localities.



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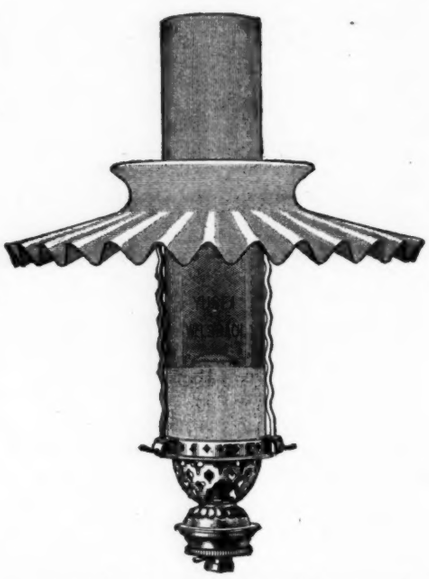

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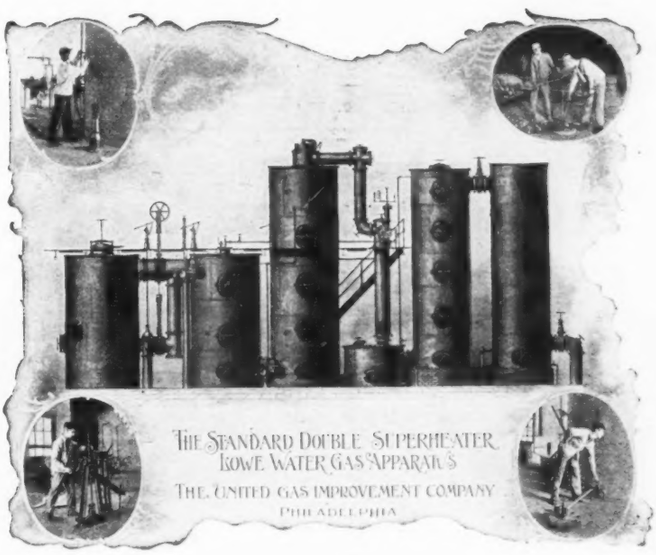
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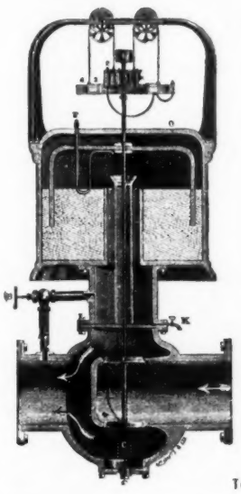

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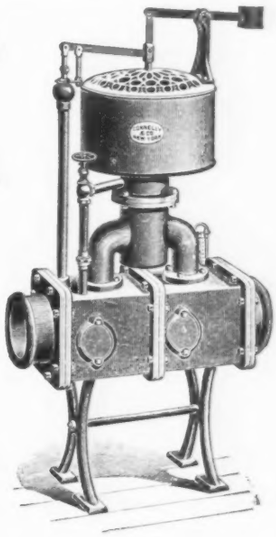

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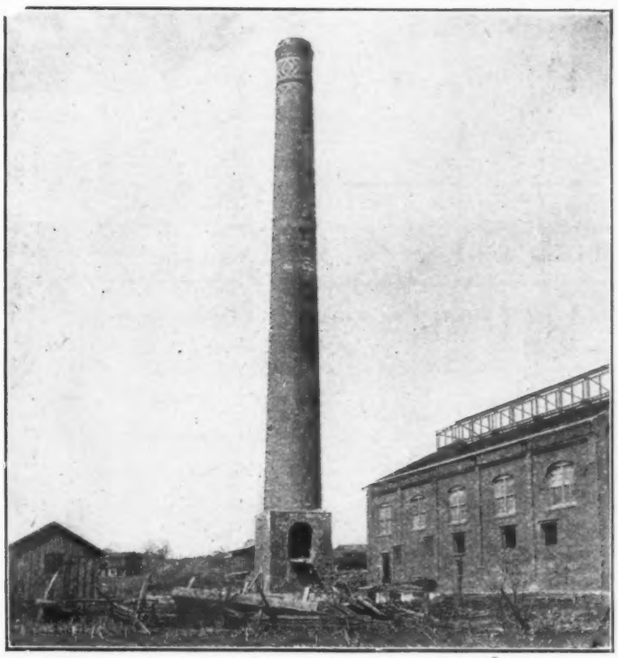

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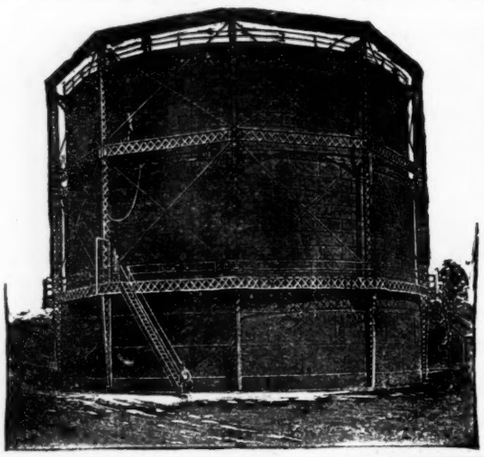

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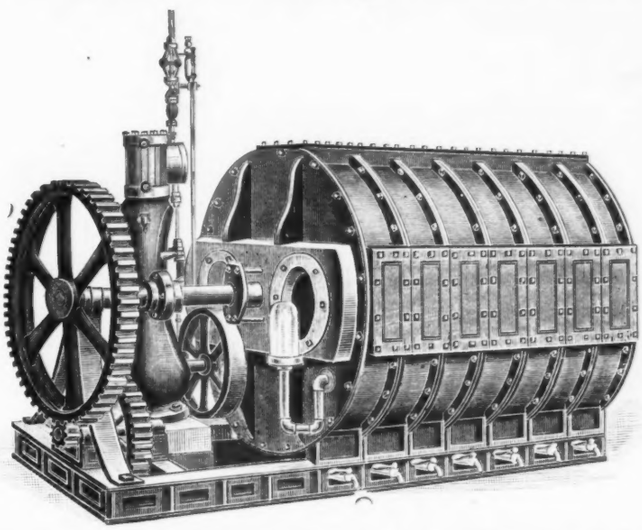

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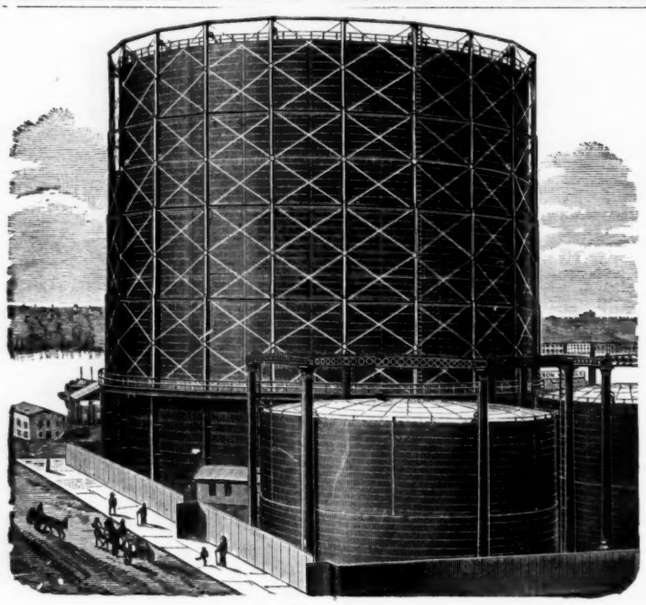

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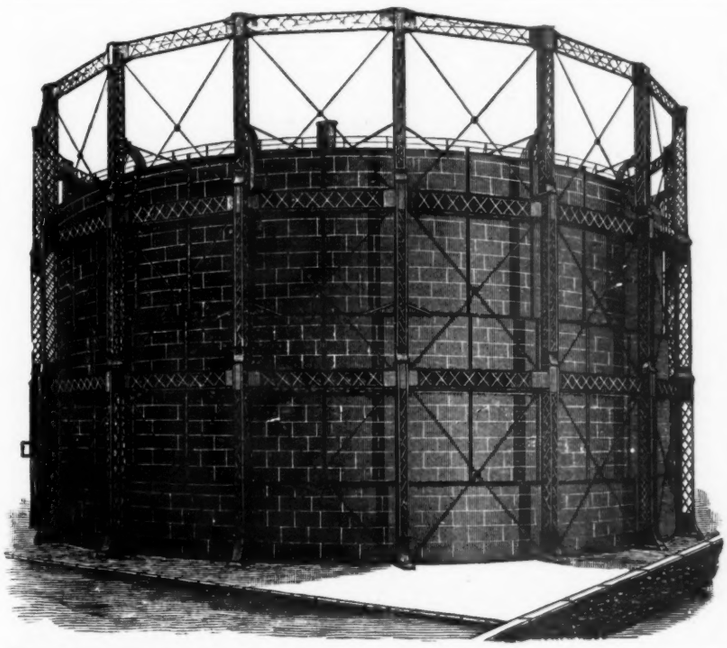

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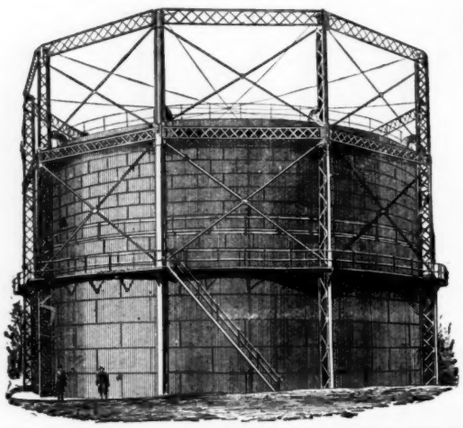

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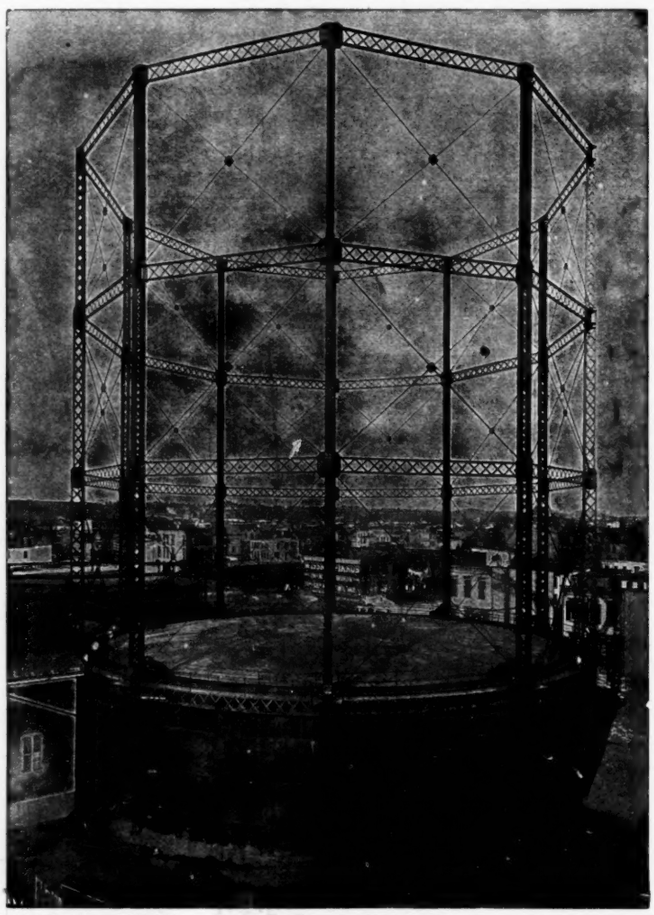

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